

# NATIONAL CAR BUILDER

VOLUME XV.  
NUMBER 3.

DEVOTED TO THE INTERESTS OF RAILWAY ROLLING STOCK.

\$1.00 PER ANNUM  
SINGLE NUMBERS, TEN CENTS.

NEW YORK:

Morse Building, 140 Nassau St.

MARCH, 1884.

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**WESTINGHOUSE AUTOMATIC BRAKE,  
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The Automatic Freight Brake is essentially the same apparatus as the Automatic Brake for passenger cars, except that the various parts are one piece of mechanism, and is sold at a very low price. The saving in accident, flat wheels, broken-down wagons and the increased speed, possible with perfect safety, will repay the cost of its application within a very short time.

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With Automatic Electric Locking, without which no interlocking is safe.

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Catalogues, Plans and Estimates, with reference to about 500 apparatus in practical operation, will be furnished upon application.

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Unsurpassed  
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Established 1858.

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**THE KING VARNISH CO.,**

Warranted superior to any steel in the Market, either English or American, for every purpose. Send for Circular and Price List.

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The Machine Tool Works,  
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First-class Machine Tools and Steam-hammers for  
R. R. Shops.  
(Satisfaction guaranteed.)

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We offer to Railway Companies the only Exclusively Independent Self-Acting Freight Train Brake which has yet been adopted by any Railway in the World. Our Steam Driver and Tender Brake is acknowledged to be the Cheapest, Simplest and BEST Power Brake now in use. Is now used by over 100 different Railroads.

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See advs. on back cover.



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Trade-Mark Patented.  
This Paint is used by nearly all the  
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Used by I. S. & M. S. Wabash R.R., C. C. & I.  
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IRON CLAD PAINT CO. Cleveland Ohio.

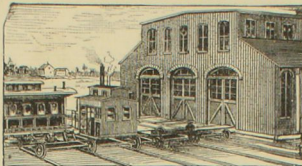
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For 1880, 1881, 1882 and 1883.

PRICE \$3 EACH.

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"OLD STYLE"  
Double Coated Roofing Tin.  
All the prominent roofers are using it. Send for samples and prices.

Robinson's Patent Improved Steam Power Transfer Table.

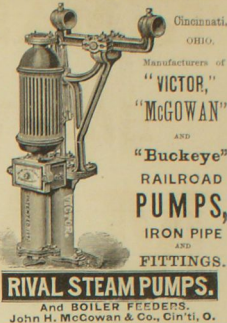


Only two men required to handle the  
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Tables Built to Order.  
Power Applied to Tables now in Use.  
Awarded Silver Medal at the Na-  
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THE JOHN H. MCGOWAN COMPANY



# NATIONAL CAR-BUILDER,

NOW IN ITS  
FIFTEENTH YEAR,  
HAS THE  
LARGEST CIRCULATION OF ANY RAILROAD PAPER

AMONG  
Managers, Superintendents, Purchasing Agents, Master Mechanics, Master Car-Builders, and Business Men Generally  
IN THE UNITED STATES AND CANADA.

OVER 6,000 NEW SUBSCRIBERS IN ONE YEAR.

Advertisers will receive more returns for their money in the CAR-BUILDER than any other railroad paper. We can refer to many of the leading manufacturers in the country, who are  
now using the paper, by the following Letters taken from a large number received by us:

NATIONAL CAR-BUILDER, 140 Nassau Street, New York:

Gentlemen: It gives us great pleasure to say that among the many R. R. Journals in which we have advertised during the past three years (all of them good), we have derived more direct benefit from THE  
National Car-BUILDER than from any other R. R. Journal. We hope to remain with you as long as you continue to publish so well conducted and able a R. R. paper.

NATIONAL CAR-BUILDER:

Gentlemen: In renewing our advertisement in your valuable journal for the ensuing year, we desire to say that we feel that it has been of greater value to us in the sale of our Springs than all the other R. R.  
papers combined. Fifteen years' use of your columns to bring our Manufactures to the notice of the R. R. Officials permits us to know whereof we speak.

Also to a large number of railroad men who do the buying business for railroads, and could print over 100 letters like the following:

R. M. VAN ARSDALE, PROP. NAT'L CAR-BUILDER, N. Y.:

Dear Sir: I enclose please find my subscription for another year. Having perused with much interest each number of the CAR-BUILDER for the last 14 years, must say that I have failed to find a single number  
that has not been both interesting and instructive, and that all railroad men who may read the paper will be benefited by it.

R. M. VAN ARSDALE, ESQ., PROP. NAT'L CAR-BUILDER:

Dear Sir: As renewals of subscriptions for periodicals are in order at this time, and in renewing mine I think no better opportunity is likely to occur than now for me to say that I have noted with pleasure the  
steady, healthy growth of your paper, as I have read it for at least ten years past, and think it contains matter on various subjects that will make it almost indispensable to officers of R. R. Co's, especially in  
the operating departments. With the compliments of the season, I am,  
Very truly yours

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Dear Sir: I enclose please find one dollar in renewal of my subscription to your paper. I am much pleased with its manifest improvement during the past year, making it more and more valuable for the  
information it contains in the interests of railway rolling stock; and I also think it is the best paper for the use of business men in reaching the supply departments of railroads. Wishing you continued success,  
I am, yours truly,

GOODDELL & WATERS.

WOOD WORKING MACHINERY, 3101 Chestnut Street, Philadelphia, Pa.

Awarded Silver Medal at the National Railway Exposition, Chicago, 1883.

Yours respectfully

(signed) GOODDELL & WATERS.

NAT'L CAR SPRING CO.

RICHARD VOSE, President, 10 Barclay Street, New York.

(signed) NAT'L CAR SPRING CO., by RICHARD VOSE, President.

THE N. Y. CENT. & HUDSON RIV. R. R. CO.

Office Sup't Car Dep't, GRAND CENT. DEPOT, Room 16, LEANER GAREY, Superintendent, New York, Jan., 1884.

Your truly,

(signed) LEANER GAREY.

BALTIMORE AND OHIO R. R. CO.

Office of MASTER CAR BUILDER, L. PACKARD, Master Car Builder, Baltimore, 1st Jan., 1884.

Very truly yours

(signed) L. PACKARD.

BOSTON & ALABAMA R. R. CO., ALBANY, MA.

Office of MASTER CAR BUILDER, L. PACKARD, Master Car Builder, Boston & Albany R. R. Co., Albany, N. Y., Jan., 1884.

Very truly yours

(signed) L. PACKARD.

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Street Car, Buffer,  
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Journal and Equal-  
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Pennsylvania Railway Co.'s Standard 20-ton Bolster Spring.

**BRAKE RELEASE, SWITCH, VALVE AND MACHINERY SPRINGS FROM BEST CRUCIBLE STEEL.**  
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112 Broadway, Room 88; H. A. LITTLE, Agt. 52 Mason Bldg; JOHN KENT, Agt. 246 Clark Street; J. M. HOGAN, 209 N. Third Street; M. M. DUCK & CO. Agent.



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YOUR ATTENTION IS INVITED TO OUR LARGE AND VARIED STOCK OF

## HARDWOOD LUMBER and VENEERS,

OUR OWN MANUFACTURE, EMBRACING CHOICE SHADED AND FIGURED

# MAHOGANY

IN VENEERS, PANEL THICKNESSES, ETC.

Stock for Head Linings, etc., and all other desirable woods for CAR BUILDING purposes. Reasonable prices. Sample order solicited.

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186 to 200 Lewis Street, Fifth to Sixth Streets, E. R., New York.

CALVIN WELLS.

PITTSBURGH

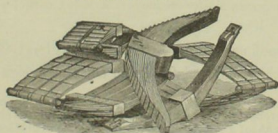
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## CAST-STEEL SPRING WORKS

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MANUFACTURERS OF

EXTRA TEMPERED,



LIGHT ELLIPTIC

## CRUCIBLE CAST-STEEL SPRINGS,

WITH PATENT HOT COMPRESSED BANDS FOR RAILROAD CARS AND LOCOMOTIVES.

UNITED STATES CENTENNIAL COMMISSION, OFFICIAL REPORT.—Diploma and Medal awarded for Good Design, Excellence of Workmanship and Material, Uniformity of Action and Durability.

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Office: TENTH ST., near PENN AVE.,

PITTSBURGH, PA.,

MANUFACTURERS OF HAMMERED



LOCOMOTIVE AXLES

We make a Specialty of our well-known brand of Railway Axles marked "Special" from new iron, guaranteed to be purely fibrous, and to stand the regulation drop test of the Penna. R. R. Company.

ALSO,

## BAR IRON & BOLTS,

Channel and Angle Iron, Bridge Bolts, plain and upset ends, all sizes, Track Bolts, Square and Hexagon Head Bolts, Rivets, Washers, Fish Plates, Etc.



# NATIONAL CAR-BUILDER SUPPLEMENT

## AND EXPORT EDITION.

At the request of prominent Railroad officials and others, we commenced three years ago the compilation of accurate lists of the American Manufacturers of Railroad Rolling Stock and Materials, published them in the form of a Supplement to the NATIONAL CAR-BUILDER, and distributed it gratuitously to every official in the Purchasing and Mechanical Departments of every Railroad in the United States, Canada, Mexico, Central and South America, West Indies, Australia, New Zealand, and such other foreign countries as could buy Railroad Material in the United States with advantage. Although the undertaking involved an amount of labor and expense that was not anticipated, the outlay was fully warranted by the very flattering reception it received by Railroad men and the business community generally.

We are now preparing the FOURTH ANNUAL "SUPPLEMENT AND EXPORT EDITION," and it will contain as follows:

- Complete lists of every Car and Locomotive Builder, Axle, Car Wheel and Car Spring Manufacturer in the United States and Canada.
- All the Rail Mills of the country.
- Complete lists of the Street Railroads in the United States and Canada, their Gauge, Weight of Rail, Mileage, Number of Cars and Horses, Officers' Names and Addresses.
- The Railroads (both Steam and Street) in Mexico, Central and South America, the West Indies, Australia, New Zealand, with the Gauge, Weight of Rail, Mileage, number of Cars and Locomotives, Officers' Names and Addresses, &c.

THIS IS THE ONLY PUBLICATION THAT HAS EVER GIVEN THIS INFORMATION.

It will be distributed *gratuitously* to every person whose name appears in the paper, and in addition will be sent to every General Manager, Superintendent, Purchasing Agent, Chief Engineer, Master Mechanic, Master Car-BUILDER and Road Master of all Railroads in the United States and Canada.


The Supplement is the **ONLY** advertising medium which reaches street Railroad Officers, and is the **BEST** and **CHEAPEST** means of reaching Railroad Officers in adjacent foreign countries.

It is the experience of the publishers, during the past three years, that Railroad men and others keep the "Supplement" on their desks or hung near at hand throughout the year for reference, not only for the lists, but for the advertisements, which form a conveniently indexed collection of trade circulars of nearly two HUNDRED of the best and most responsible manufacturers of railroad material—a collection not to be obtained in any other way.

As to its value as an advertising medium, we respectfully refer to a few of the prominent manufacturers who have used its pages, as follows:

Adams & Westlake Manufacturing Co., R. R. Supplies, Chicago, Ill.  
 Allen Paper Car Wheel Co., Car Wheels, New York and Chicago.  
 Baldwin Locomotive Works, Philadelphia, Pa.  
 Baltimore Car Wheel Co., Car Wheels, Baltimore, Md.  
 Bickford, H., Upright Drills, Cincinnati, O.  
 Bradley & Co., Power Hammers, Syracuse, N. Y.  
 Brill, J. G. & Co., Cars, Philadelphia, Pa.  
 Brownell & Wight Car Co., Street Cars, St. Louis, Mo.  
 Chilled Car Wheel Grinding Co., Chicago, Ill.  
 Cliff & Righter Co., Car Springs, Oswego, N. Y.  
 Congdon Brake Shoe Co., Chicago, Ill.  
 Detroit Car Spring Co., Detroit, Mich.  
 Devoe, F. W. & Co., Paints and Varnishes, New York, N. Y.  
 Fairbanks & Co., Scales, New York, N. Y.  
 Fay, J. A. & Co., Wood Working Machinery, Cincinnati, O.  
 French, A. & Co., Car Springs, Pittsburgh, Pa.  
 French Spiral Spring Co., Car Springs, Pittsburgh, Pa.  
 Goodell & Waters, Wood Working Machinery, Philadelphia, Pa.  
 Hancock Inspirator Co., Injectors, etc., Boston, Mass.  
 Hathaway, Charles, Street Railway Contractor, Cleveland, O.  
 Hopkins, D. A., Journal Bearings, New York, N. Y.

Howard, James L. & Co., R. R. Supplies, Hartford, Conn.  
 Helmbacher Forge and Rolling Mill Co., St. Louis, Mo.  
 Iron Clad Paint Co., Metallic Paints, Cleveland, O.  
 Jones Car Manufacturing Co., Cars, Schenectady, N. Y.  
 Maher & Brynton, Car Wheels, Cleveland, O.  
 Mesker, A. B. & Co., Pig Iron, Chicago, Ill.  
 Midvale Steel Co., Axles, etc., Philadelphia, Pa.  
 National Car Spring Co., Car Springs, New York, N. Y.  
 Northwestern Horse Nail Co., Horse Nails, Chicago, Ill.  
 Penfield Block Co., Tackle Blocks, Lockport, N. Y.  
 Pennsylvania Steel Co., Philadelphia, Pa.  
 Porter, H. K. & Co., Locomotives, Pittsburgh, Pa.  
 Rogers, C. B. & Co., Wood Working Machinery, Norwich, Conn.  
 Stephenson, John Co., Street Cars, New York, N. Y.  
 Sweet's Manufacturing Co., Toe Calks, etc., Syracuse, N. Y.  
 Union Brass Manufacturing Co., Car Trimmings, etc., Chicago, Ill.  
 Valentine & Co., Varnishes, New York, N. Y.  
 Westinghouse Air Brake Co., Pittsburgh, Pa.  
 Westinghouse Machine Co., Engines, etc., Pittsburgh, Pa.  
 Whitney & Sons, Car Wheels, Philadelphia, Pa.  
 Wilson, Walker & Co., Forgings, Pittsburgh, Pa.

 A sample copy of the above paper will be sent on application.

ADVERTISEMENTS ARE SOLICITED AT THE FOLLOWING RATES:

One full page, 14 inches deep and 9 1/2 inches wide, \$150; three-quarters of page, \$125; half page, \$100; quarter page, \$75; smaller spaces, \$10 for first inch and \$5 for each additional inch (single column).  
 For further particulars, address

NATIONAL CAR-BUILDER "SUPPLEMENT,"

Morse Building, 140 Nassau Street, New York.



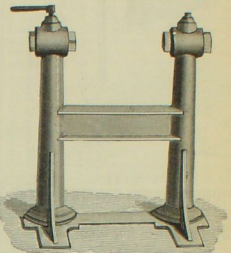
# UNION STONE COMPANY,

38 and 40 HAWLEY ST., BOSTON, MASS.,

PATENTERS AND  MANUFACTURERS  
OF THE

## UNION EMERY WHEEL.

Emery Wheel Machinery and Tools a Specialty.  
Automatic Knife-Grinding Machines.  
WOOD-POLISHING WHEELS,  
EMERY, QUARTZ, CORUNDUM.  
GRINDERS' AND POLISHERS' SUPPLIES.  
Catalogue on Application.



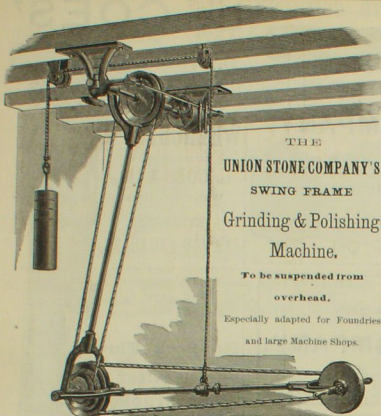
CUPOLA POLISHING FRAME.

THE  
UNION STONE COMPANY'S  
SWING FRAME  
Grinding & Polishing  
Machine.

To be suspended from  
overhead.  
Especially adapted for Foundries  
and large Machine Shops.

The work is placed on the floor, bench or truck, the emery wheel is swung at will to conform to the straight or uneven surface. The wheel, being at universal joint, may be carried back and forth or swung at will; and the frame carrying the wheel being also suspended by the counterpoise weights joined to a similar horizontal telescopic rod, makes it easy to twist the wheel over to any angle or give it any range of movement, up or down. The operator can seize the handles on each side of the wheel, and carry it to any portion of the work desired. A boy can operate it, by substituting a circular "scratch brush" for the wheel, its value in the cleaning room of a foundry is apparent to all familiar with the old laborious and process.

The machine is also a valuable accession to the machinery of any general machine shop, for grinding off flus, spurs and imperfections, instead of chipping and filing. It leaves the work looking better, and may be performed by a cheaper hand; and by substituting a polishing wheel for the grinding wheel, the work can be finished to a fine polish.



# GILBERT CAR MANUFACTURING COMPANY, TROY, N. Y.

URI GILBERT, Presd. and Treas.

R. E. RICKER, General Manager.

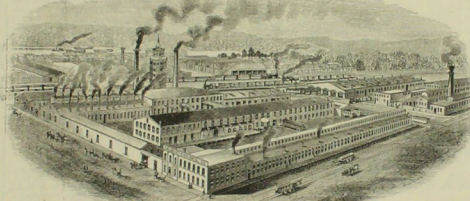
WM. E. GILBERT, Secretary.

EDWARD G. GILBERT, Vice Presd. and Asst. Treasurer

MANUFACTURERS OF

ALL KINDS AND SIZES OF

Steam and Street  
RAILWAY CARS.



Building, Dissecting and  
Packing Cars for Export  
a Specialty.

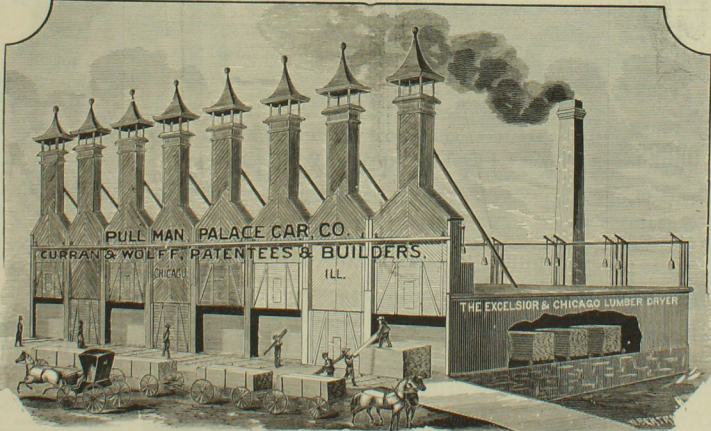
—ESTABLISHED 1820.—

—INCORPORATED 1879.—

# THE EXCELSIOR AND CHICAGO LUMBER DRYER IS BUILT UNDER 16 PATENTS.

PAYS FOR ITSELF EVERY YEAR.

Storing Capacity. 40,000 Feet Inch Lumber.



DRYING  
5,000 FEET PINE  
EVERY 24 HOURS.

RAILROAD COMPANIES AND CAR-BUILDERS WHO ARE USING THE EXCELSIOR AND CHICAGO LUMBER DRYER:

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Norfolk & Western R. R. Co., Roanoke, Va.	3	Louisville & Nashville R. R. Co., Louisville	3	Southern Car Co., Car-Builders, Knoxville, Tenn.	4
Winnington & Weldon R. R. Co., Wilmington, N. C.	4	Pullman Palace Car Co., Chicago.	4	Georgia Car Co., Car-Builders, Cartersville, Ga.	5
De Grey & Rio Grande R. R. Co., Denver, Col.	5	Wells & French Co., Car-Builders, Chicago.	5	Gilbert & Bush Co., Car-Builders, Troy, N. Y.	6
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C. & M. & Paul R. R. Co., Minneapolis, Minn.	8	Harney & Smith Mfg. Co., Car-Builders, Dayton, O.	8	Northern Pacific R. R., Brainerd, Minn.	9
Memphis & Charleston R. R. Co., Memphis, Tenn.	9	Jackson & Sharpe Co., Car-Builders, Wilmington, Del.	9	H. & D. R. R., Richmond, Va.	10

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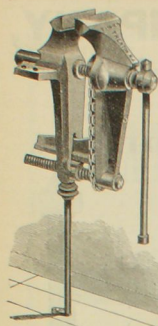
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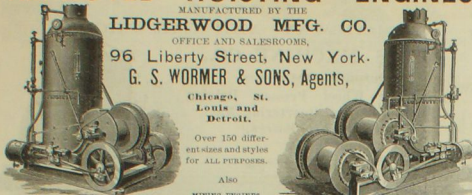
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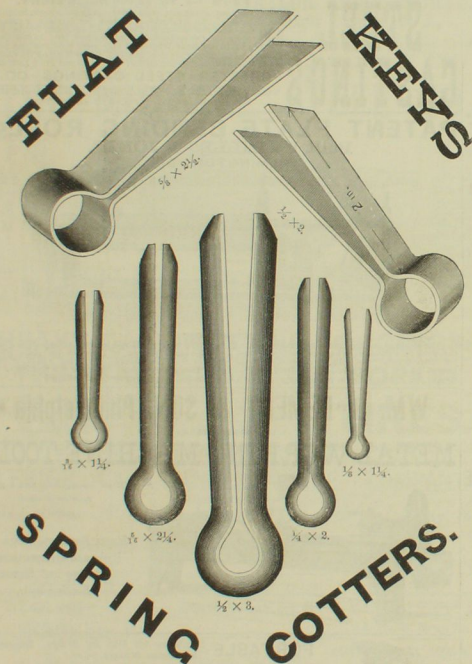


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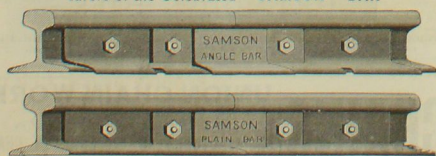
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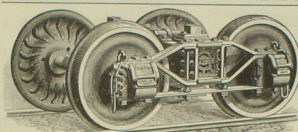
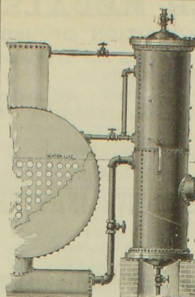
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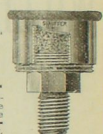
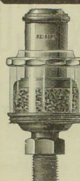
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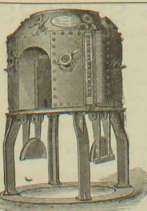
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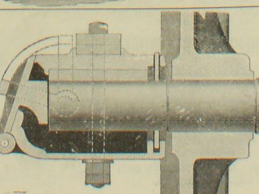
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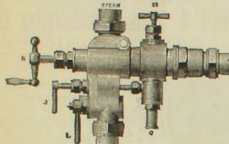
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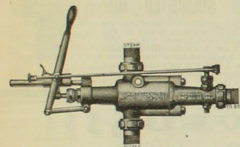
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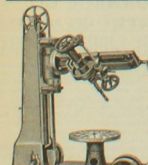
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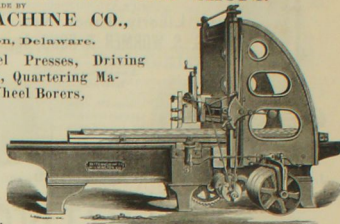
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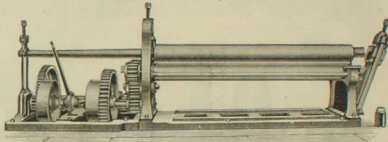
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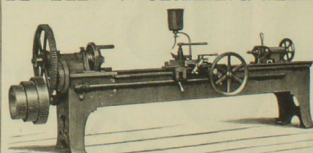
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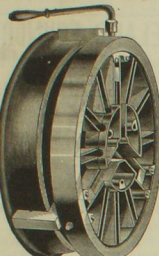
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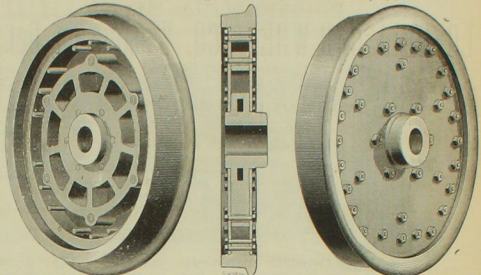
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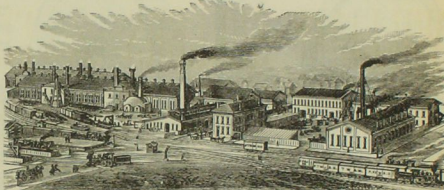
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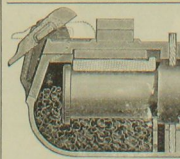
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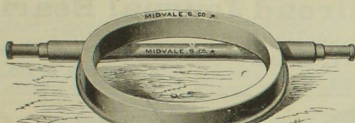
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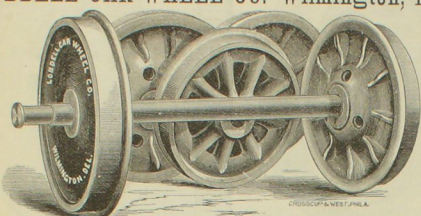


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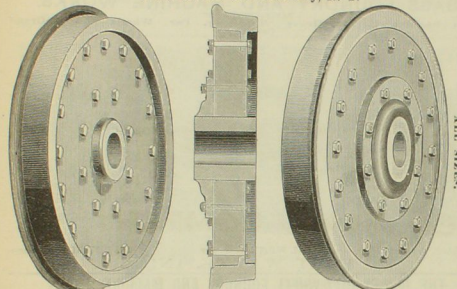
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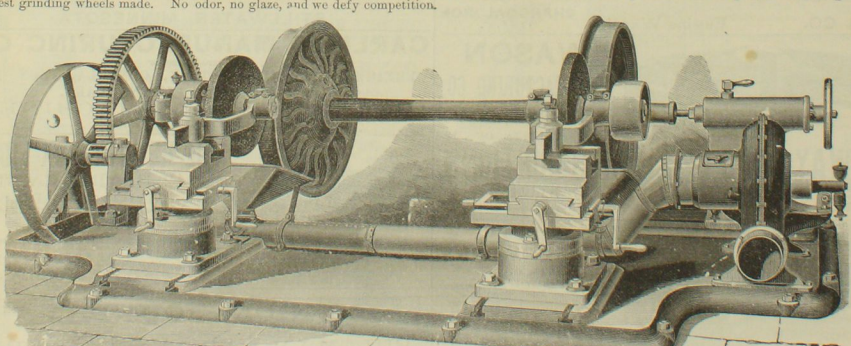
Wheels with flat flanges, and otherwise badly worn, that are ordinarily condemned and used for scrap iron, can be ground and fitted so as to double their original mileage. This alone makes our machine the greatest money saver ever introduced to railroads.

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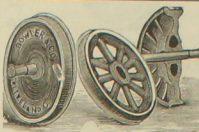
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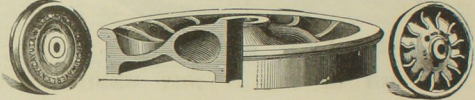
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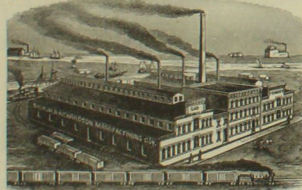
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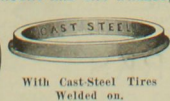
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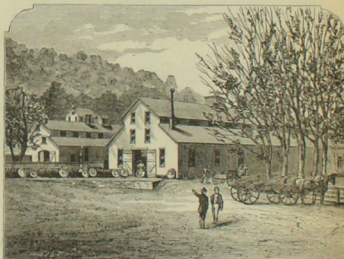
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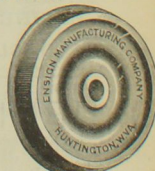
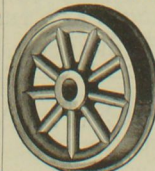
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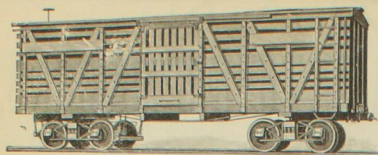
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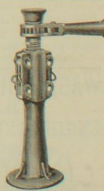
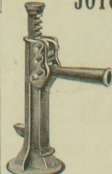
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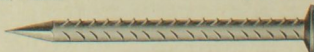
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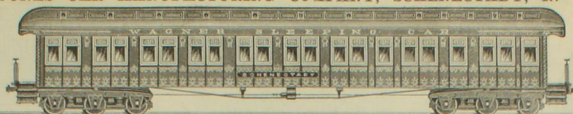
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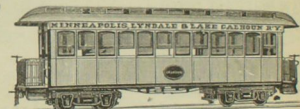


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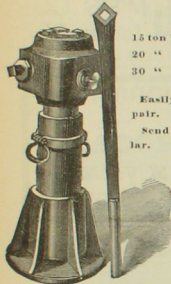




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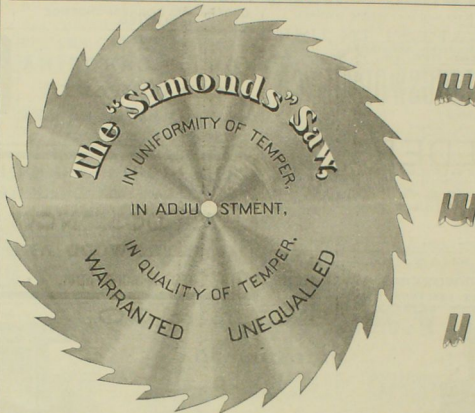
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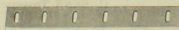
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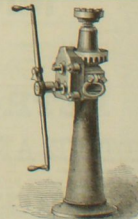
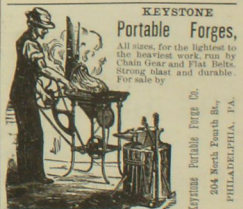
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SAFE, NEVER RUN DOWN UNDER  
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THAN ANY OTHER JACK.

USE IT

The Michigan Central R. R.  
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Saves Wages by Quick Speeds, Heavy Cuts and Few Grindings,

And is at least five or six times as durable as the best Cast Steel that can be made.

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Crucible Cast Steel Locomotive Tyres, Best Yorkshire Bar Iron for Stay Bolts and Locomotive Parts, Best Yorkshire Iron Boiler Plates.

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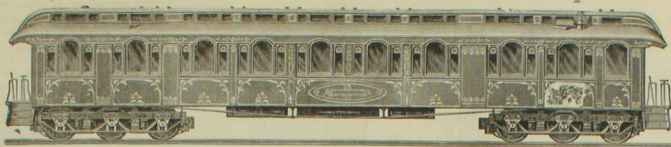
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VOLUME XX.  
NUMBER 3.

MARCH, 1884.

SINGLE NUMBERS, TEN CENTS.  
\$1.00 PER ANNUM.

## Miscellaneous Items.

The Baldwin Locomotive Works have recently shipped twelve locomotives to a railroad in the Argentine Republic.

The *Railway World* has been removed from 433 Walnut street to its new offices, 19 South Fifth street, Philadelphia.

The works of the Buckeye Car & Manufacturing Co., at Columbus, O., have been purchased by the Baltimore & Ohio Railroad Co.

The Illinois Central Railroad Co. are building 14 new locomotives of the double-end type for suburban traffic, and three moguls for road traffic.

GEORGIA long-leaf pine, in lengths of 54 feet, is worth in Wilmington, Del., \$45 per thousand for car-building purposes. It must be sound, of course, and free from sap and large knots. One corner-sap will pass inspection, but a piece with two corner-saps is rejected.

The car and locomotive departments of the Kentucky Central road have been consolidated and placed under control of Master Mechanic A. H. Watts. The office of Master Car-Builder, which has been held for the last thirty years by J. L. Hackathorn, has been abolished.

LEATHER wheels are made in France for railroad cars. The inventor of the process is M. de la Roche. Untanned buffalo hides are cut into strips, and these are built up into solid discs, which are strongly held together by two iron rings after they have been subjected to hydraulic pressure.

MR. H. B. COBB, having severed his connection with the Wakefield Rattan Co., of Boston (the original manufacturers of rattan car seats and backs), that company will hereafter be represented by Mr. F. H. Henry, who has been connected with this department of its business for several years.

THE St. Charles (Mo.) Car Company have just delivered 250 coal cars to the Missouri Pacific Railway, and are now working on 250 box cars for the same company, and a number of refrigerator cars for the Klausmann Brewery Company. Their wheel foundry is kept going on orders from Texas roads.

THE Diamond State Car Spring Co., of Wilmington, Del., have recently added a new building, 20 x 36 ft., to their works, and have put in about \$3,000 worth of new and improved machinery; they report several orders in hand, among them one large order for draw-springs from the Central Pacific road.

THE New York, Lake Erie & Western road, familiarly called "Erie," is putting steel tire wheels under its passenger cars as fast as practicable. There are now between 500 and 600 of these wheels on the road, and so far during the cold season not a tire has been broken nor a train stopped from a defective tire.

It is said that arrangements have been perfected whereby the limited express trains of the Pennsylvania Railroad will be supplied with Mann boudoir cars after March 15th, and the express trains of the Baltimore & Ohio after March 1st. These cars will be attached to these trains in connection with the Pullman cars.

THE Wyoming Valley Manufacturing Co., of Wilkes-Barre, Pa., have recently built a large mine locomotive for the Atchison, Topeka & Santa Fe road, for use in the Baton Coal & Coke Co.'s mine at Baton, New Mexico; they are also building two mine locomotives for W. S. Kemmerer & Co., for use in their mines at Sandy River and Harleigh, Pa.

In the report of the proceedings of car-builders' meeting at Buffalo, in our last issue, Mr. J. R. Petrie, of Black Rock, is made to say that the Pittsburgh & Rochester, among other roads, had defective drawing attachments. It should have read Philadelphia & Reading instead of Pittsburgh & Rochester. The error was caused by a hasty guess at the meaning of initials.

WORK has begun on the construction of the New York & Connecticut Air Line Railroad, better known as the "Old Parallel." Mr. Henry R. Parrott, of the Parrott Varnish Co., at Bridgeport, one of the leaders in the movement, broke the first ground. A large force of men will immediately be set to work. Mr. Parrott has been for several years prominently connected with the enterprise of running a parallel road, and intends to have a stroke at

the last spike which may be driven on the completion of the line.

The passenger cars of the Philadelphia & Reading road are lighted with gas made from naphtha, or gasoline. This has been found to be preferable to coal gas, for the reason that under compression it does not lose nearly as much candle-power. Coal gas, when compressed, deposits a carbonaceous substance in considerable quantities, and to this the loss of illuminating power is supposed to be due. Naphtha gas does not make such deposits, and hence gives a better light. The company have gas works at Reading, which they have used for twenty years.

The manner in which Mr. George Stephenson, the famous engineer, hit upon the standard gauge of 4-8 1/2 is said to be as follows: When about to build the first rail road the question of how wide the rails should be apart troubled him somewhat, and he took a rule and measured an ordinary wagon track. The tracks were laid 4 ft. 8 in. apart; but when the cars were placed on the rails it was found that half an inch would have to be added to the width in order to allow for the lateral motion of the wheels, hence the standard gauge of 4 ft. 8 1/2 in.

A RAILWAY track has been built around the Brush Electric Light Works, in Cleveland, O. On this track Charles T. Brush, the electrician, and his assistant, will test a new electric motor applied to street cars. An old Woodland street car has been repaired, and the motor and electrical machinery placed on the front end. The electricity will be in the car, and not in the rails, as in the Edison system. By this method the conductor of the car can operate the motor, and stop or propel the car at will. The new invention, if successful, will probably be put in use on the street car lines of Cleveland.

MR. H. D. GORDON, the Master Mechanic of the P. W. & B. road at Wilmington, has a welding machine for putting ends on boiler tubes. With this machine, two men can in one day put ends on 160 tubes, the actual heating of the tube and end, and making the weld, taking only about one minute, the remainder of the time being consumed in dropping the bottoms of the furnaces, cleaning out the fire, etc. The weld, when finished, is as smooth and neat as need be, and experience has proved that the life of the tubes is nearly as great after the welding as before.

A RAILING (N. C.) paper speaks of a curious-looking car that recently arrived at that place from Chicago, as follows: "At the depot is a great railway car, painted green, so covered with lettering as to look like it had had a bad attack of alphabetic measles. This car serves a curious purpose. It brings meat here from Chicago. It takes, say, fifty days to cure bacon. It is put in this 'traveling smoke-house,' after undergoing the curing process for, say, twenty-five days, and is then shipped here, curing all the time. It gets here in good shape. Mr. A. A. Thompson, to whom the car is consigned, gives us the information."

THE Chicago & Northwestern Railway Co. are building four new dining cars of the unusual length of 64 feet. They have at one end double doors, one for the kitchen, the other for passengers. The cars are very conveniently arranged. The ice-closets, pantries, heaters, etc., are all separated from the car proper. They will seat 50 persons, and will cost about \$10,000 each. In the locomotive department four new passenger engines, 16 x 34, are under way. A new feature about them is the doing away with cross-stays between the crown bars, making the crown bar itself act as such a stay.

It is a question whether in the building of passenger cars too much importance is not attached to truss-planks for holding the car up in the center. A pair of these planks, 15 inches deep and 3 inches thick—which is larger than the ordinary size—will support a load of 8,000 pounds when the weight is equally distributed between the transoms; from which it is easy to see that the planks are useful only as binding-pieces and as forming compression members in the trussing. There are many parts of a car-frame the utility and importance of which are apt to be overrated unless they are carefully investigated, and truss-planks may be classed among them.

MR. R. B. MITCHELL, General Manager of the Blue Line, has issued the following notice to agents and connections: "I am in receipt of the following from the New York Central & Hudson River Railroad Co.: 'We are subjected

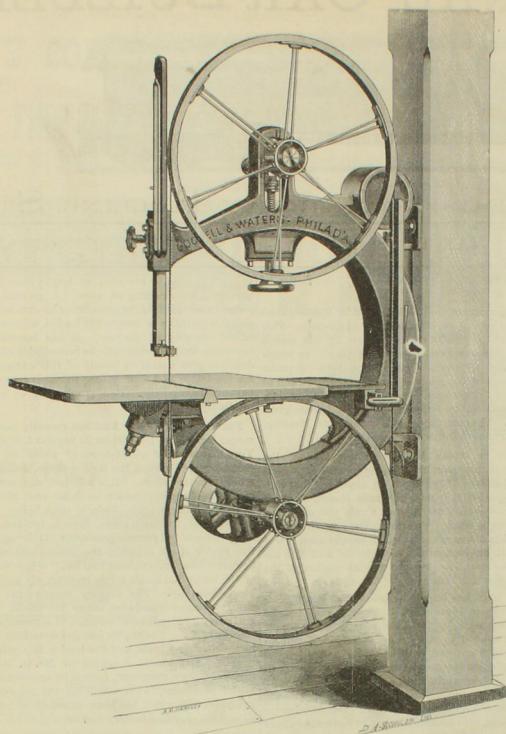
to much trouble by breaking of trucks from the effects of persistent overloading of cars. A general impression seems to prevail that the capacity of all cars is twenty tons, and this quantity is frequently loaded without regard to actual capacity of the car. It has become absolutely necessary that this difficulty be remedied, and I therefore desire to give notice on behalf of this company that we are forced to and shall refuse to receive any car loaded beyond its capacity.' Please note and be governed accordingly."

THE Boston & Albany road has recently put a new passenger locomotive (No. 36) on its regular 4-30 train to New York. It is one of a half-dozen of about the same style that have been built at the Boston shops, but differs somewhat from the others. It is a 40-ton standard American eight-wheel engine, 18-inch cylinder and 23-inch stroke, 54-feet driving wheels, 52-inch steel boiler with wagon top, and 221 two-inch tubes, 72-inch fire-box and calculated to carry 160 pounds pressure. It is equipped with the Taylor spark arrester, the Richardson balance valve, Seibert "boss" oil-cup and two No. 9 injectors. The shell of the boiler has single rivets transversely and double rivets horizontally. The driving wheels have Krupp steel tires, and paper wheels are under the truck. The tender will carry 8,000 gallons of water, and is mounted on Krupp steel wheels. The engine has the American steam brake on the driving-wheels, and the tender is equipped with a coupling attachment invented by Mr. G. H. Colby, the division master mechanic, for use in connection with the Miller platforms, with which all the passenger cars are equipped, and which has been attached to other locomotives with very satisfactory results.

SAN FRANCISCO is to have a new up-hill cable road, 1700 feet long. Its construction will be different from those now in operation. Two separate cables will run in two trenches, similar to those in common use. To one end of each cable a car will be permanently attached by an arm extending down from the car, through a slot in the trench. The power required will be supplied by engines at the upper terminus, having link motion, so that one car can be allowed to unreel its cable and run down its own track by power of gravitation, while the other car will be hauled up on the other track. Of course only two cars can be used on the road at a time, and each will exclusively occupy a track of its own. Each cable will be supplied with an electric conductor, connecting the car with the engine-room. Thus the conductor of a car, by touching a button, can signal the engineer and instantly have his car started or stopped. The cars will be 22 feet long, half open and half closed, and mounted on four wheels instead of four-wheeled trucks. The cable will be similar to those commonly in use.

THE Rogers Locomotive Works, Paterson, N. J., recently completed bituminous coal-burning passenger locomotives for the New York, West Shore & Buffalo Railroad, which were designed specially to work heavy fast passenger trains. The engines have cylinders 18 x 24 inches and the driving-wheels are 48 inches in diameter. This gives upward of 144 pounds for each pound of effective pressure per square inch of the piston's area. The boiler of each engine is straight, and has some peculiarities not usually seen in American locomotives. All the boiler is made of Otis steel. The outside shell is 3/8 inches thick, and the dome sheet 1/2 inch thick. The smallest outside diameter of the boiler is 55 inches. The tube sheets are 3/4 inch, the sides and back sheets of fire-box are 3/4 inch, and the crown sheet 1/2 inch thick. The side sheets are corrugated, the depression being only 1/4 inch deep. The circumferential seams of the boilers are lap-jointed, and are held by a single row of rivets 2 inches between centers. A weld 84 inches wide and 61 inches long laps the bottom flange of the boiler in 55 inches. The tube sheets are also lap-jointed with a single row of rivets, but they are strengthened throughout their entire length by a weld 8 inches wide, the rivets in this being 4 inches apart. An extended smoke-box is placed on all the engines. A deflector, netting, and approved spark-arresting appliances are also used. The back part of the smoke box is 4 inch thick, and the part resting on the saddle is stiffened by an iron sheet 4 inch thick. The extension of the smoke-box is 1/2 inch thick, and is attached to the back part by an iron ring, 5 x 12 inches.—*Railway World*.





AN IMPROVED BAND-SAW.

The accompanying illustration represents an improved form of band-saw made by Goodell and Waters, of Philadelphia, which is especially adapted for pattern-making and cabinet work. It dispenses with the ordinary heavy iron base, and consequently with a large proportion of the weight and room occupied, and can also be made on this account much cheaper than the ordinary form without its efficiency being in any way impaired. Beside this reduction in the cost of the machine, the decreased weight also insures a greater economy in transportation and in setting up, the total weight of the machine complete being about 650 pounds. This saw can be attached to any size or shape of column, and will run with all the steadiness and accuracy of a heavier machine. It is often desirable to have a band-saw in a small room on an upper floor where it would be difficult, if not impracticable, to put a saw with a heavy frame. It is for such places that this machine is peculiarly adapted on account of its lightness and compact form, as it can be carried up an ordinary stairway by two men. The wheels, which embody quite a number of improvements, have hubs some 3 inches in length, with annular projections extending parallel to the axis on the periphery of the hub, through which a number of holes are drilled. The spokes, which are of  $\frac{3}{8}$ -inch round iron, and threaded on each end, are screwed in these holes, as may be seen by reference to the cut. The spokes are held by nuts on each side of the annular projection, which arrangement enables the operator to true up the wheels if from any cause they get sprung. The wheel rims are made of six thin strips of wood glued together and covered with an endless rubber band in the ordinary manner, and are trued up on the inside before the spider-*i. e.*, hub and spokes—are put in. The uniform strain, expansion, contraction and sudden stress caused by chips getting between the saw blade and wheels is allowed for by a combination of weight and spring, which tends to elevate the hub of the upper wheel. The weight maintains a uniform tension, compensating for variations in length arising from temperature, while the spring, which is merely a heavy rubber washer about  $\frac{1}{2}$ -inch in thickness, regulates the tension of the saw in case of any sudden friction or strain. This combination is designed to save the machine from all sudden jars and the consequent breakage of the saw. The table is so arranged that it can be tilted to any desired angle within  $45^\circ$ . The makers claim that, notwithstanding its lightness of construction, it is fully as efficient as the larger and heavier band-saws.

MR. E. L. BUSHNELL, of Poughkeepsie, N. Y., manufacturer of springs for millwrights, car seats, car backs and berths, has opened a factory at 320 Wabash Avenue, Chicago, Ill.

The New Orleans *Picayune* says that the Illinois Central Railroad construct all their rolling stock in the South at their shops at Water Place and McComb City, and for their cars they use Southern timber exclusively. Yellow pine is considered by car builders to be the best lumber for constructing box, stock, and flat cars, and thousands on thousands of feet of yellow pine lumber are annually shipped to St. Louis, Louisville and other Western cities, where it is used for car-building purposes. The machine-shops of the Illinois Central at McComb City are very extensive and complete in their appointments. All the locomotives for the road are built there, and last year two locomotives for the Natchez, Columbus & Jackson narrow-gauge road were constructed at the McComb City shops. These engines were found to be equal to the finest sent out from the North, and their cost was much less.

THE JACKSON & SHARP CO. have adopted a style of finish for the outside of passenger cars similar to that of the cars of the Philadelphia & Reading road. It consists of 2-inch panels with beveled instead of beaded edges. The ordinary beading is difficult to varnish, and the cleaning up in the rubbing coats is expensive. The V-groove formed by the beveled edges looks well, and at a short distance can hardly be distinguished from beading. It cleans up almost as well as a flat panel. At the works of this company the paneling is put on in a peculiar way. It is glued to the horizontal stuff underneath. The inner panels are gained on to the posts. The space between the windows and floor has two widths. A 60-foot Woodruff sleeper, with 12 sections, is in course of construction. The inside paneling in this car is made flush with the sills and glued on, and after being finished is scratch-planned to receive the gluing of the outside panels, which are put on with blind nails. The car has three floors, the upper one being double, with felt paper between the two. The floor below, in the middle of the sills, has a cover of felt paper packed in with strips. The frame is then sheathed up on the bottom in the usual way. This construction not only deadens noise very effectually and keeps the car warmer in cold weather, but adds stiffness to the frame. Three sides of the sills are painted, and the whole inside of the frame glue-blocked. The total thickness of the paneling is 1 1/2 inches.

## Fitchburg Railroad Passenger Car Construction.

The engravings on opposite page show some of the details of construction of the passenger cars of the Fitchburg Railroad, of which Mr. John W. Marden is the Master Car-builder.

Fig. 1 is an inside view of the side frame of one of these cars as it stands in the shop in process of construction and before the inside finish is put on. The corner of the car, with a portion of the waistcoat, is also shown. Fig. 2 shows an inside corner of the same car, with portions of the main roof and clear-story; and Fig. 3 shows a panel and brace as seen from the inside. The floor and outside panels are already finished.

The aim of the builder in all the details of this construction is to produce a very strong car and at the same time a very light one. To this end every detail has been well considered, and the quality of the workmanship kept up to the highest standard of excellence. The joints are everywhere made with care and put up in good shape. The bolts and window braces are of the usual patterns; but the thrust is taken in a way that is somewhat of an innovation upon ordinary practice. The heads of the braces come close up to the window-sills, the sills being made in short lengths and gained into the posts. Between each pair of posts a block of hard wood  $\frac{1}{4}$  in. thick, is driven, as shown at A A A, Fig. 1. These blocks cause the thrusts to be transmitted as directly as if the window-sills were of a single piece, but have the advantage of leaving the posts uncut and with their full strength, nor are they subjected to any twisting strain. The cut shows the three windows nearest the end of the car. The post between the second and third windows is immediately over the transom. The brace rods bear directly against the posts, but so far below the sills that a considerable strain tending to break the post, would be felt if the blocking should be omitted. On account of the lightness of the posts, this would be a serious matter. The block, however, makes the construction as stiff as the ordinary heavy post would be, framed in the usual manner.

Above the transom, and just under the window-sill, there are two lines of panel rails to which the panels are secured by screws. There are three screws to each panel, in addition to the usual nailing from the outside. To make the work still more secure, the panels are all fastened to the frame by three-cornered blocks glued into the corners, and taking a bearing on both frame and panel. These blocks are got out in quantities, and are made by splitting square stuff diagonally.

In most openings in the frame four of these pieces are used, but in some cases more are employed. The posts are 1 inch, and the window panel furring is got out  $\frac{1}{4}$  inch. In all parts of the framing care is taken to keep dimensions as small as possible, in order to avoid superfluous weight. Two wood screws to each post hold the truss-plank in place. This plank is got out from a wide plank, and has a considerable camber. When it is bolted in place it resists, of course, the natural tendency to sag, and stiffens the entire structure. The sill and plate-rods have enlarged ends, the body of the rods being  $\frac{1}{2}$  and the ends  $\frac{1}{4}$  inch.

In the roof construction there are some points in common with that of the roofs of the Boston & Albany passenger cars, but there are differences in detail and in the form of the clear-story and finish. The ends of the short carlines are much wider than the middle portion, which has the advantage of giving an open room to gain two strips of furring into the carlines at the top and bottom, as shown in Fig. 2. Both ends of the carlines are thus firmly held, and at the same time firm nailing strips are obtained at exactly the points where they are most needed.

The window openings are very large, and the glass is of a corresponding size, being about  $22 \times 32$  inches. Curtains are used hung on plain spring rollers. The bottom rod of the curtain has a head at each end which works in a dove-tailed groove.

In the finishing of these cars Mr. Marden makes use of a plan which lessens the cost of work very considerably, and is worthy of being adopted wherever the style of work will permit. It consists in finishing in the strip, before putting up, all moldings, long rails, etc., and in rubbing and polishing panels, doors and the sides and ends of the seats in the paint shop, instead of deferring it until they are in place in the car. The rubbing down and polishing being done at the bench, it is done more cheaply and quicker. In fact, the greater portion of the inside surface of the car is finished in the paint shop in advance of putting up. In order that the work may be done in this way, however, it is necessary to design the finish so the nails may be covered by moldings as much as possible. Then, with the exception of a slight touching up here and there, the painters have nothing to do in the car after the finish is in place. The appearance of the saloon panels, door casings and saloon ends, done in this way, shows that the quality of the work is improved at the same time that the cost is lessened.

At the annual meeting of the Allen Paper Car Wheel Co., held Feb. 13, 11,071 shares were represented. The old board of directors and the old officers were unanimously re-elected. The report of the President shows a large increase of business for the year just closed over any previous year.



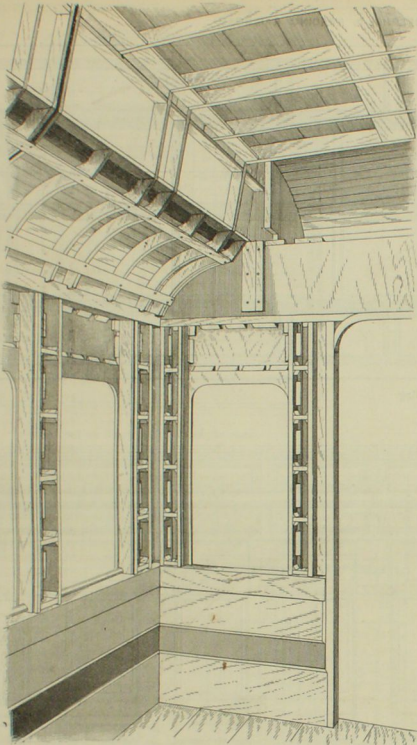


Fig. 2.—Inside Corner, Main Roof and Clear Story.

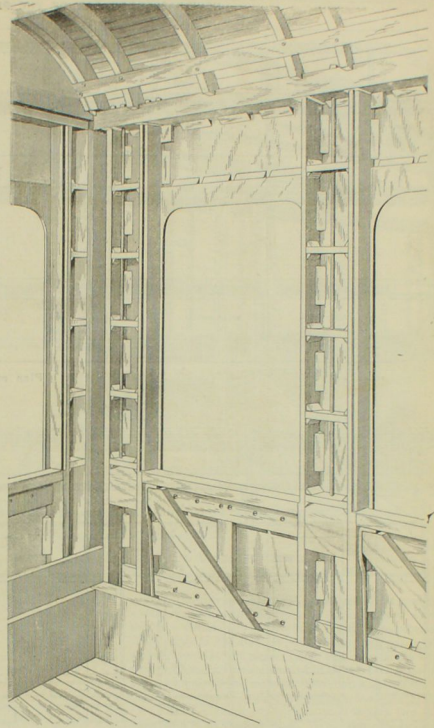


Fig. 3.—Panel and Brace, from Inside.

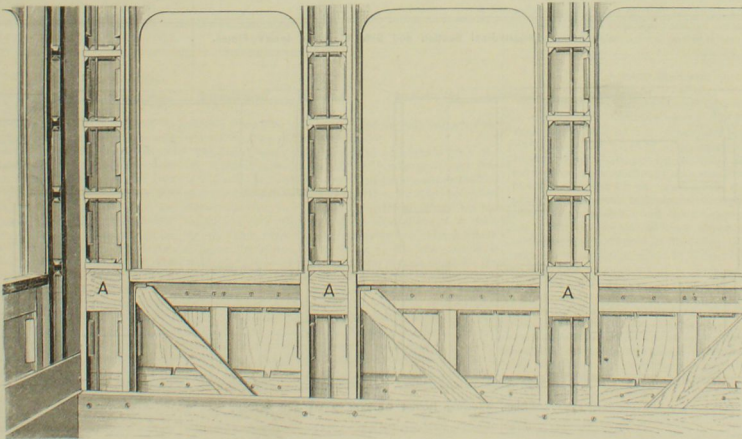


Fig. 1.—Inside View of Side-Frame.

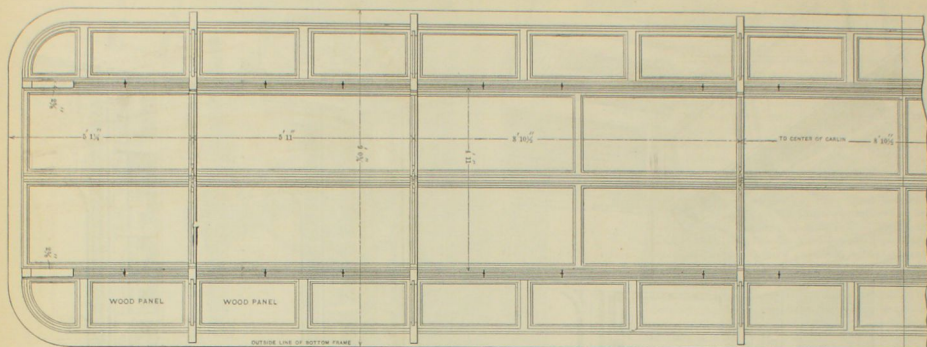
THE "Peninsular Car Co." has been organized at Detroit. Its executive officers are the same as those of the Peninsular Car Works,\* which now operate the shops at Detroit and Adrian. The new company will succeed to the business of the last-named company, and will at once begin the erection of extensive new shops near the Detroit, Grand Haven & Milwaukee Junction, where the present Detroit and Adrian shops will be consolidated.

THE new round-house of the Baltimore & Ohio Railroad Co. at Baltimore, which has been built expressly for the construction of parlor and sleeping-cars, is the largest round-house in the world under one roof, its dimensions being, circumference, 270 ft.; height of walls to cornice, 25 ft.; and height of building from base to apex, 135 ft. The walls are of the best quality of hard brick and the roof is a combination of wrought-iron, slate and wood.

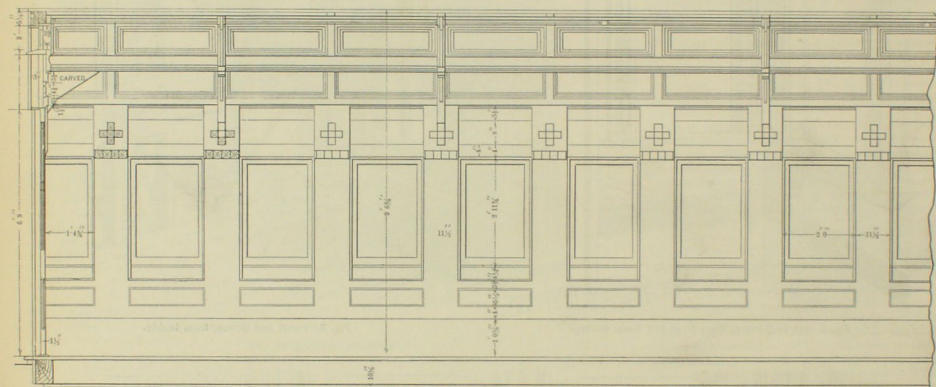
THE Hazard Manufacturing Co., of Wilkes-Barre, Pa., are busy on several large orders for cable railways, among them the Chicago City Railway Co., for which they are making 30 miles of wire cable,  $1\frac{1}{2}$  inch in diameter; and for the Kansas City Railway Co., 11 miles of cable of same diameter; they are also making a wire rope  $2\frac{1}{2}$  inches in diameter, and to weigh 23 tons, for the Ashley Plane, belonging to the Philadelphia & Reading Railroad.



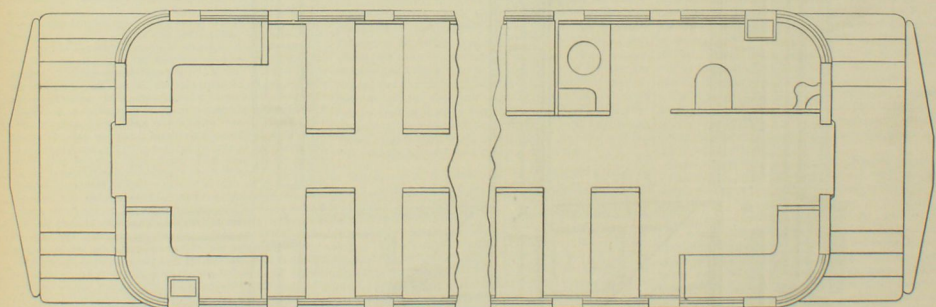
## NEW PASSENGER CAR OF THE PHILADELPHIA &amp; READING RAILROAD.



Plan of Ceiling



Longitudinal Section and Side Elevation—Inside Finish.



Plan, Showing Round Corners, Seats and Saloon.

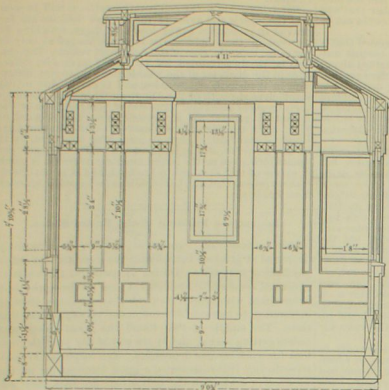
The engravings illustrate some of the peculiarities of the passenger cars of the Philadelphia & Reading Railroad in their constructive details, in which respect, as will be seen, they differ very decidedly from the prevailing styles of construction on other roads.

The cars are 48 ft. 8 in. long, exclusive of platforms, and 9 ft. 4 in. wide over sills. The platforms are 2 ft. 9 in. wide, making the length of the car over all 53 ft. 2 in. The saloons, including a toilet room, take up the space of two seats, in addition to the usual end seat, and there still remain seats enough for 56 persons—an unusual number, considering the length of the body. This extra seating

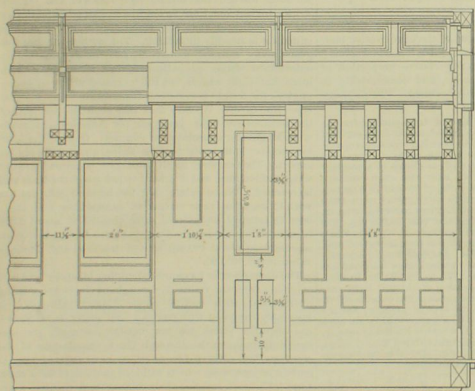
capacity is accounted for by the absence of stoves, and the rounding of the corners of the cars so the corner seats may be extended on a curve corresponding with the rounded corners and seat three persons. The style of the inside finish and the form of the roof are the most striking features, as contrasted with the prevailing methods. The rafters of the roof are straight and run directly from the plates to the apex of the clear-story. There is an entire absence of moldings on the outside of the car body, and this, with the rounded corners, presents as little resistance to the wind as possible. These rounded corners do not at first make a favorable impression upon those who are familiar with the

square corner construction, in which the corner-post, firmly secured to the sills and reaching to the plate, gives an impression of security and strength which is not altogether warranted. This post has really very little resisting power above the window-sill, and below the sill the square corner is comparatively weak, except as against a direct blow upon the car end. If the blow is from the centre line outward, the end of the sill is pretty sure to be carried away; but with the corner framing, as shown in Fig. 1, there is a very considerable increase of strength over that of the ordinary construction. The corner and end are shown just ready to receive the panels. It will be





Cross Section Showing End of Saloon.



Side View of Saloon.

observed that the side and end sills are connected by a piece of timber placed at an angle of 45 degrees with each. This is secured to each sill by a ship-splice, and the "round" of the corner is worked out of the solid timber; so that a blow on this part meets with as much, or even more, resistance than it would from a square corner. The panel-rail and the plate are jointed in the same way, the curve being worked from solid wood and the joints made, as shown in the engraving. The truss-plank ends at the pair of posts next the corner window, and its form is continued by a piece of timber worked to the curve. The splices of these parts are glued and secured with wood screws and bolts. All the moldings, the outside finish over the panels, the letter-board and the finish beneath it, are of bent ash, carefully secured to each of the posts by glue, nails and screws. The paneling goes on outside, and is firmly secured at each piece of the frame by blind nailing. The inside finish at the corner is also bent, and consists of a piece of mahogany  $\frac{1}{4}$  in. thick. This is cut on the back in the usual way for bending, and each of the saw cuts is filled up with a piece of wood glued and driven in.

The ash letter-board, the deep moulding below it, and a stout piece of blocking beneath forming the upper portion of the corner, are unquestionably stronger than any other joints that could be put in that place. The posts themselves are 1½ in. square and are connected by pieces of blocking near the top. The panels between the windows on the outside are composed of three 4-in. pieces. These panels, after being put in place, have two pieces of blocking put on the inside with a wood screw into each panel. The framing below the window-sill is flush. Within the past year or so the strength of this corner, as well as its other advantages, have been demonstrated once or twice in a very satisfactory manner. One of these cars some time since received a severe blow on the corner, which, from the speed at which it was going, and the weight of the car with which it came in contact, would have wrecked the corner of an ordinary coach. The blow, however,

glanced from the round corner, and the only damage done was the scraping of the paneling.

The end elevation and section in connection with the Fig. 2, showing the inside of roof,\* conveys a very correct idea of the form of the roof, which is constructed like that of a house with straight rafters and a ridge-pole. The sides of the clear-story rest on the purlins. There are six rafters to a car. They consist of a plate of iron 4 in. wide by  $\frac{1}{2}$  in. thick, with straight feet welded on at each side to go upon the plates. The centre of the iron carline is widened, as shown by the horizontal portion to which the bell-cord hanger is attached. The wooden rafters, which are bolted to each side of it, are cut out so as to give an arched appearance to the roof and leave the iron projecting. It is finished bright and is shellacked, and makes a very attractive contrast with the natural wood of the rafter. Manifestly the construction is as strong as it can be. The timber is straight-grained, and a minimum quantity is used. The clear story is 4 ft. 11 in. wide. The main roof is finished in large mahogany panels. At the corner of the raised and lower roofs is a conical panel with a round bottom, flanked on one side by a handsomely carved bracket supporting the raised roof-sill. This bracket is imperfectly shown in the longitudinal section.

The seats have wooden frames with hinged backs. The advantages of this method of construction are that the frame is more in harmony with the finish of the car than one of iron would be, while in case of an accident the broken frames will do much less damage than those of iron. The jointed arms, which are self-locking, make it possible to use a very wide back without spreading the seats to an inconvenient distance. The finish around the windows on the inside is as plain as on the outside, and is noticeable on account of the absence of moldings. It consists of working the edges of the panels to quarter-round

\* This cut is unavoidably crowded out of our present issue. It will appear in our April number, together with illustrations of the heating apparatus of these cars.

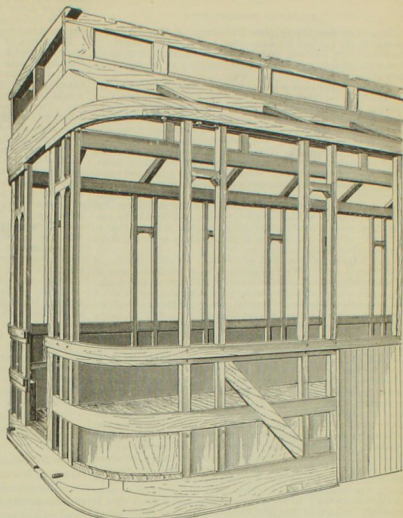


Fig. 1—Corner Framing.

curves. Strictly speaking, the panels consist of quarter-rounds worked in the solid wood. Around the windows this is a particularly comfortable finish, presenting no sharp edges to the head or arm of the third passenger. Rosette carvings are placed above and between the windows. These rosettes are worked in the solid wood and do not project above the surfaces. The external structure of the saloon, with its straight sloping roof, is shown in the cuts. The decoration of the roof panels is very odd, and deserves a word of description. It consists of a series of broken lines running into each corner and parallel with the sides. These lines are of raised gold on a warm, light yellow brown. The gold work is raised apparently almost  $\frac{1}{4}$  of an inch above the surface by means of a special preparation of plaster of Paris and size. The effect is very fine, and it would seem that a similar use of gold might be used to advantage on natural woods.

#### Color-Blindness.

The result of Dr. William Thomson's investigation as to the extent of color-blindness among the employees of the Pennsylvania Railroad is of considerable interest, and suggests changes that might be advantageously made in the present system of danger signals. Dr. Thomson found that the average proportion of train hands having defective color sense is about 4.2 per cent, while those absolutely color-blind and unable to distinguish between a gray and a green, or a green and a red color, constitute fully 4 per cent. Perhaps one of the most important conclusions reached by him is that, while the defect is generally congenital, it is sometimes caused by disease or injury. It has too often been assumed that it is constitutional, and that when once a railroad company have weeded out the color-blind signalmen from their service, those who are left may be always relied upon to properly distinguish the signals. If, however, as Dr. Thomson finds, the most common form of disease—red-blindness—may be acquired by those who were once fully able to stand the tests, all train men should be examined from time to time. It is certainly of importance to know that, according to a high French authority, color disease may be produced by straining the eyes in dim light, and it is but reasonable to expect that railway employees would be liable, however perfect their color sense may originally have been, to develop either partial or absolute color-blindness. It has been found that some who are color-blind are nevertheless capable of distinguishing correctly between danger and safety flags, but, as Dr. Thomson suggests, they are guided by form, and not by color, and the proposition to make every danger signal peculiarly recognizable by both its form and color deserves attention.

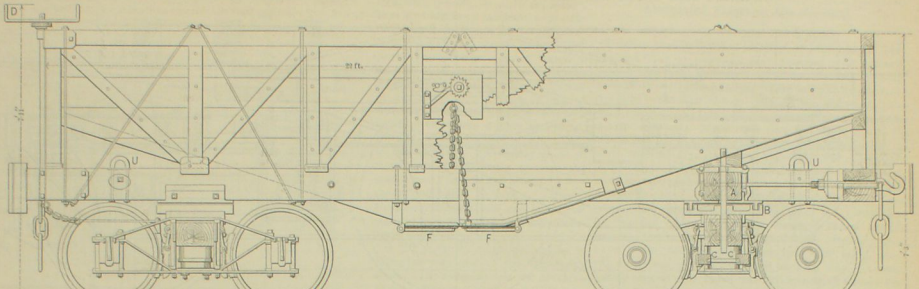
"Ticket, sir!" said a conductor at a railway terminus in the city to a gentleman, who having been a season-ticket holder for some time believed his face was so well known that there was no need for him to show his ticket. "My face is my ticket," replied the gentleman, a little annoyed. "Indeed!" said the conductor, rolling back his wristband and displaying a most powerful fist. "Well, my orders are to punch all tickets that pass this platform."



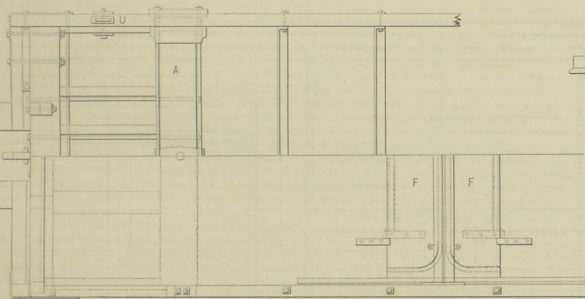




TWENTY-TON COAL CAR—PHILADELPHIA & READING RAILROAD.



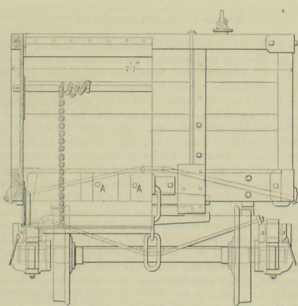
Side Elevation and Section.



Plan of Floor, Drop-Doors and Truck.

The engravings show the construction of a 20-ton coal car of the Philadelphia & Reading road. The body of the car is 22 ft. long and 7 ft. 7 in. wide over all. The weight of load and car is a heavy weight per journal, and the axles are consequently much larger than the standard. The brakes are hung from the bolsters and are put on each truck. The side sills are 4 x 10 in., and take the whole strain of drawing and buffing. The transoms A and end sills are of oak, the former 12 in. thick and the latter about 10 x 10 in. There are four intermediates between transoms and end sills. The central part of the frame is open to make room for the drop-bottom. The slant of the hopper is such that the load can be discharged in about three minutes. In the trussing of both transom and bolster there are so arranged as to obviate the necessity of boring the timbers. This arrangement is shown in the end view and in the longitudinal section. The saddle through which the king-bolt passes takes the transom truss rods, leaving the strength of the stick intact. The caprope rings cover the end of the stick so there is no need for mortising. These outside truss-rod are more quickly put in place and more accurately bent to form than the common styles which are sunk in the timber itself. The body posts are 3 x 4 or 3 x 5 in., according to position, and the braces are 4 in. wide by 3 in. scant in thickness. The siding is 1 1/2 in. U-bolts, as shown, are inserted for convenience in switching. The bottom of the car and the two drop doors, F, F', are of iron. The doors are pieces of plate simply strengthened by the bent angle-iron, as shown by the dotted line in the plan. These irons are bent to shape and then riveted on. The chains and winding gear are of the usual style.

The trucks are of unusual strength. The upper arch-bars are 1 x 4 in., and the lower ones and tie-bars 3/4 x 4 in. A wedge shaped casting, and the wedge-shaped washer at the top of the inner pillar of the oil box, are used as the bent part of this upper bar comes between the bolt holes. The advantage of this little peculiarity in the construction is not always apparent to the casual observer. The rectangle which carries the box is not altogether dependent for its support upon the strength of the bolts and resistance of the bars to bending, but has a brace on its top which contributes very much to its support and keeps it from getting out of square. The truss is also extended so far as to carry the load directly to the point of support. The center-bearing plate, shown at B in plan and section, is 22 inches in diameter. A rim on the upper plate falls into a groove in the lower one, thus securing good lubrication combined with a large bearing surface. The center-plate casting is 37 inches long, and has 3/4 inch flanges on each side for holding the bolster in position. The brake beams C, C' are hung on links in the usual way, and double brake levers are used. The arrangement of the levers is shown in the plan. Each brake is independent of the other, and is operated from each end of the car respectively. The connection with the brake staff is shown at the left end of side elevation, and the position of the ratchet at the opposite end of the plan. Instead of the usual brake wheel a double handle, D, is used, as shown. The draw-bars of the pattern commonly used in the coal regions, and have three links of chain attached. The



Section and End View.

draft is from the transom and in a direct line with the sills. The books will stand a strain of 30,000 pounds. The axles are a little over 4 inches in diameter in the center, and have 4 x 8 journals, a size that has been used upon the road for many years with the most satisfactory results. Double dead blocks are used. They are 9 inches thick by 18 inches deep, and are faced with iron, and, as may be inferred from the form of the draw-gear, they take the buffing direct.

Dirt Burging.

In the shops of the Philadelphia & Reading road, at Reading, Pa., an old locomotive boiler has been mounted to drive a stationary engine. The fuel used is literally coal dust and dirt, which, seems from inspection to contain a little combustible material as the cinders deposited in the front end of an engine having a spark arrester. Yet this fuel is burnt at the rate of 14 pounds per square foot of grate surface. The combustion has been carried as high as 17 pounds, but this rate cannot be regularly maintained owing to the uncertainty of the work and the liability of getting holes in the fire. The best results are obtained at from 10 to 14 pounds per square foot. At this rate a duty of 7 pounds of water per pound of fuel has been obtained,

which is certainly a little remarkable. The fire on the grate is thin and the combustion very perfect. The draught is so moderate and the combustion chamber so large that apparently none of the cinders reach the tubes.

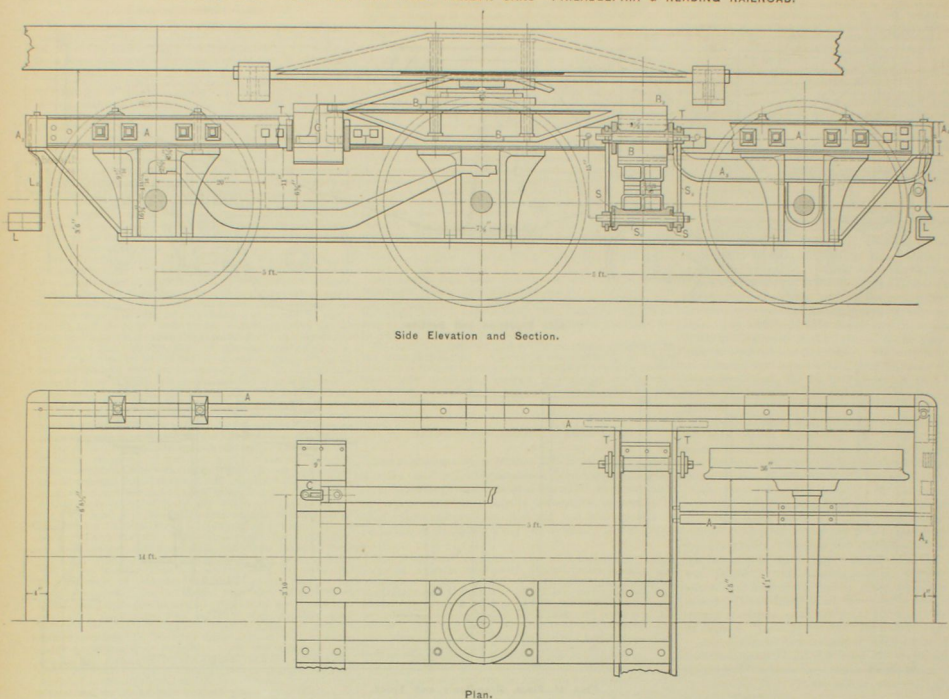
The barrel of a boiler just completed at these shops for a dirt-burning engine is made of 3-inch steel, is 34 inches in diameter in the smallest sheet, and is telescoped back to the wagon top. As it appears when jacked up in the shop it is sufficiently massive for a compound marine engine. The buckwheat or dust coal used by the road has some advantages, especially for switching engines, that are worthy of note. In starting one of these engines the solidity of the fire prevents the blast from pulling the fire to pieces as it does when lump coal is used. The moment the exhaust stops the coal drops back on the grate and banks itself down, so that combustion practically ceases when the engine stops working, although the fire does not go out. A switching engine under these conditions can stand for hours without blowing off steam, and still keep hot, while lump coal, and coal of a larger size, permits more or less draught to go through it and continues to burn when the engine is standing still and doing nothing.

A new method of warming street cars has been on trial for several weeks on the DeKalb avenue line in Brooklyn. About 70 cars have been fitted up with the appliances, which is a very simple one and does not encroach on the seating room for passengers. Two pipes run under the seats on each side, charged with a composition of acetate of soda, which at each trip is heated by a jet of steam sent through it from a stationary boiler at the stable. The compound being heated is dissolved into liquid, and upon cooling throws out into the car the heat stored in it. This heat is pleasant and moist, and, without being intense enough to be disagreeable, is sufficiently strong for passengers to enjoy with ordinary out-of-door wraps, the temperature by actual record being maintained at 40 degrees higher than that outside the car. Thus, if the thermometer is down to 20 degrees above zero the average temperature of the cars is kept at 60 degrees above.

The performances of the locomotive whistle, we are told, have been systematized on a Western railroad. Seven whistles are to indicate "down breaks," thirty-two whistles, "up breaks," forty whistles and two snorts, a "back-up." The instructions add: In case of doubt, whistle like the d—d—! at street-crossings, "whistle considerably." Again: "Always whistle before dinner. Require the fireman to keep the whistle-valve open during dinner. After dinner, whistle when you wake, then back up. Then go ahead with a whistle, a squirt, and a ring."



SIX-WHEEL IRON TRUCK FOR SIXTY-FOOT PARLOR CARS—PHILADELPHIA &amp; READING RAILROAD.



The drawings illustrate a six-wheeled iron truck used under 60-foot parlor cars on the Philadelphia & Reading railroad. These trucks are built entirely of iron. They are 14 ft. long and have a 10-ft. wheel base. The length of axles between centres of journals is 6 ft. 8½ in. The wheel-pieces are made of two channel bars *A*, held at the required distance by jaws which pass up between them and serve as distance pieces. The bars are 6 in. deep and separate 2½ in. The top of the compound beam thus formed is 9½ in. wide. The jaws have 4 horizontal and 2 vertical bolts through them, all the bolts having square cast-iron washers, those on top spanning the space between the channel-irons.

The end pieces of the truck are made from angle iron of the same depth as the bars, but 4 in. wide on top. The double transoms *T* are made of 1-in. iron with the ends turned up at a right angle, and are 5 in. deep in the centre. At each end, the D-shaped hole, shown at *V*, is punched to receive the casting which carries the links. In punching this hole hot, the bar receives the swell, and its section is not as much diminished as the size of the hole would indicate. The end view shows the shape of the transom, but the arrangement of the casting is best shown in the sectional part of the side elevation. The safety-beam *A*, in side view is fastened as usual to the end piece *A*, and the transom. In this case, however, it is formed from a piece of deep T-iron. One of these pieces is shown in the plan. This completes the frame of the truck. The swing-beams, instead of being a solid box, are formed from two broad flat plates of iron, disposed in the form of a truss *B B*, in the end view. This truss has its lower cord horizontal, and takes the spring seats at each end. In the centre it carries one end of the truss *B<sub>2</sub> B<sub>2</sub>*, which supports the centre-plate. The side elevation shows the arrangement of the truss for carrying the side bearings and centre-plate from the swing-beams. At the ends of these beams, which are 9 in. wide, a casting is placed to support the side bearing truss and casting *C*. The swing-motion is of the usual pattern, with links hung 4 ft. 10 in. apart, and about 15 in. between centres. These links carry castings which form the spring seats *S*. In the ordinary sense of the term, there is no spring plank, its place being taken by two flat bars of iron *S S*, set edgewise, and which merely hold the spring seats at a proper distance from each other. They are seen in the end and side views of the truck. The springs are in this case doublets, and are 36 in. long. The brake beams *L L* are hung in the usual way, although the link *L<sub>2</sub>* is attached directly to the brake-shoe. Referring to the plan at *A<sub>2</sub>*, a very good idea will be obtained of the method by which attachments are made to the end piece. The angle iron furnishes a convenient surface by which the links, springs, safety-beams and hangers may be attached, in this respect showing a great advantage over any other shape that could be conveniently adopted. The equalizers are of the usual pattern, and the broad wheel-piece gives the spring seats a good bearing; these, however, are not shown in the drawings. Very little labor is expended on any of the metal used, except the wheel-pieces and transoms, the remainder of the work being plain bending and drilling to templet.

#### Boilers for Fast Locomotives.

For a number of years the Philadelphia & Reading Railroad has used the well known Wootton boiler on all classes of engines. These engines have been tested under almost every condition in which it is possible to test engines. These boilers have been employed on the lightest and fastest, as well as the heaviest and most powerful of the locomotives used by the company. They have been in use a sufficient length of time to have their durability thoroughly tested and to enable statistics of repairs to be collected. They have been tried with every kind of fuel, and the commonest dirt or dust to selected anthracite. Boilers of this sort have been run with refuse of a character which it was difficult to believe was capable of combustion. The results attained, it is hardly necessary to say, have been of a satisfactory character, and the road has adhered through many years to this style of boiler, as being the best suited to general service of any which has been proposed.

Engines of this pattern have been sent abroad, have been tried on other roads, have been put in competition with other engines. Several of the great coal roads have tried them, and even ordered numbers of engines built with these boilers. One or two of the New England roads have had engines of this construction, and have experimented with them in order to ascertain whether any considerable advantages would accrue from their use. For the moment it appeared as though nothing came of these efforts to introduce the new style of locomotive boiler. Some roads have found one reason and some another for adhering to the common type, and more than one master-mechanic has asked the question within a year as to whether anything was being done with the Wootton boiler. Like many another good and important invention, the Wootton boiler appears to have been a few years ahead of the times, and consequently it has suffered, as other similar inventions have suffered before, from not experiencing a general demand. The conditions prevailing on the Philadelphia & Reading road were peculiar. The road itself was probably, in the amount of its traffic, far in advance of other roads in the United States. Its grades, curves and coal trade were such as to tax the capacity of its engines to the very utmost. In fact, it not only taxed them to their utmost, but it taxed the ordinary American type of engine beyond its power of accomplishment, and, verifying the old proverb in regard to inventions being necessitated, the boiler was required to meet an imperative want.

The recent demand for high speed in passenger trains, coupled with the enormous weight of our sleeping and

palace coaches, has not only taxed existing engines beyond their capacity, but has driven designers almost to the wall in order to produce an engine of the standard American type capable of performing the work required. So hard, indeed, have some of our trunk lines been pushed that they have abandoned the attempt to build a better and more powerful engine, and have been content, first to cut their trains into two, and then into three sections, running them from ten minutes to half an hour apart, according to circumstances. That is, they have, in order to obtain the necessary speed, been obliged to reduce the loads of their engines from one-half to two-thirds, and increase the crews of their trains proportionately. Other roads have attempted to meet the requirement for speed fairly and squarely, and designers have been called upon to do all which could possibly be done with the American engine upon the standard gauge.

The result has unfortunately been far from successful. Large engines which ought to be powerful have been produced, but the power has been lacking. They have been capable of almost unlimited speeds with exceedingly light loads, but when required to haul heavy trains they have been far from successful. In a few instances attempts have been made to follow English locomotive practice, but with disastrous results. Neither the typical American nor English engine seems to be capable of handling ordinary American passenger trains at speeds which are now demanded by all of our trunk lines.

The reasons which have been assigned have been almost as numerous as the writers who have discussed the subject. We have had grave dissertations on the impossibility or difficulty of making parallel roads which would be safe on 5 ft. 8 in. drivers going 60 miles an hour. There has been a vast amount of consideration and labor bestowed on the designing of a link motion which would enable the steam to get in and out of a locomotive cylinder at 60 miles an hour, and at the same time perform any work. The question of the steam distribution has often been considered the most important element in the production of an express locomotive, and many a master mechanic, if the truth were known, could tell of days and nights spent over this one fruitless problem. Very many, recognizing the boiler as after all the essential feature of the express engine have expended its dimensions until the centre of gravity was as high, the waist as large and the fire-box as long as could possibly be obtained on the standard gauge. Summing up the whole of the difficulties, we find the question of boiler power is, after all, the key-note in the endeavors to obtain a powerful express engine.



## Communications.

## Antiquated Passenger Car Framing.

To the Editor of the National Car-Builder:

I notice that on quite a number of railroads in New England there are passenger cars in service with the antiquated, old-fashioned style of floor framing usually designated as "cross-framing," there being no longitudinal stringers in the central part between the transoms, their place being supplied with pieces running crosswise from one side sill to the other. Not only are there many old cars in service that are constructed in this way, but in some cases this system of cross-framing is still adhered to in new cars. A 60-foot car is now being built at the shops of an Eastern road with only two side sills, of course—running the entire length of the car body, and these sills, although of good size, are weakened by mortise holes 30 inches apart. There are a number of roads radiating from Boston that have from ten to fifty passenger cars each, some old and some new, constructed in this way. It seems hardly necessary to recall the experiences of Revere and Wollaston in order to realize the danger of this kind of car-body framing. It has been shown time and again that such cars can not be dragged over ties, frogs and switches, or over rough tracks, without ripping the floor and the ends of the car, to say nothing of the ease with which the end sills are crushed in and the cars telescoped one into another in a violent collision. Mr. Adams, in his book on railways, dwells with great minuteness on the details of the Revere accident, but says not a word as to the real cause of the great loss of life which occurred. If the trains had been made up of the standard type of car, the loss of life would have been lessened, and the loss of life would certainly have been much less; and if the cars had been constructed, as some are, with three floors and with eight longitudinal sills, the chances are that no fatal injuries would have resulted. Some idea of the weakness of this cross-framing can be formed by an examination of some of the drop-bottom coal cars on the great coal road. When one of these cars is loaded with coal, or receives a severe shock in stopping the train, the end sills frequently give way and the side sills are broken at the transoms, notwithstanding the heavy bracing and transoms and 14-inch oak-end sills.

I have no doubt that this faulty construction is well understood by many car-builders, one of whom, who is connected with an Eastern road, recently said to me in reply to some inquiries on the subject, that his road was getting rid of such cars as fast as possible; but the constrained way in which he said it, and the eagerness with which the subject was changed, showed that he was alive to the necessity of getting them out of the service, but could not carry out his wishes unless he was seconded by the management. Many of these roads are doubtless pressed for cars to carry on their heavy local traffic, and the managers would not be able to afford to throw away any considerable portion of their passenger equipment so long as it is in a fair condition. In the contingency of accident, however, and especially if its horrors should manifestly be aggravated by this vicious construction, it would probably be seen that the company could well afford to make a bundle of all these cars, the old ones, especially, rather than to run them a day longer.

MONTROSE.

## Defects in Passenger-Car Construction.

To the Editor of the National Car-Builder:

Your February issue contained a very timely communication on "The Construction of Light Passenger Coaches," signed "M. C. B." The writer is evidently a practical mechanic, and is working in the right direction. It is to be regretted that railroad men, and especially master car-builders, do not pay more attention to this very important subject. The passenger coaches of the present day are entirely too heavy and flimsy in construction. If they were built by intelligent workmen who know how to use their tools, and under the direction of competent master car-builders, such a car as described by "M. C. B." would be more durable, and a great saving in power, railroad iron, road-bed, fuel, material in construction, wear and tear of locomotives and delays caused by hot boxes, worn journals, etc. If the center sills were even longer than their present dimensions, and letter-boards and outside paneling much lighter than they are now made, and canvas on the inside put on with good hot glue, hot cauls and clamps, by mechanics who know the value of good glue and how to prepare it and put it on, the advantages would be very great.

The deck or clear-story, as now constructed, is a kind of sink-hole for superfluous lumber. In it we find sills and plates nearly as heavy as floor timbers, thick carlines and roof-boards, heavy sash with posts and panels between. The whole clear-story, in fact, seems to be designed to make the car as top-heavy as possible. There are some parts of coaches where the pieces should be larger and differently constructed; for instance, the belt-rail, which is the main stay of the car side, should be of good, sound ash and ploughed to receive the paneling or sheathing. If car-builders must use a given quantity of lumber, then by all means take it from the roofs of cars and add it to the foundation, namely, the sills.

I am decidedly in favor of dispensing with the abomina-

One of them is to have fifty fire and two steam hammers, and will be quite free from smoke, so much so, indeed, that it can be kept as clean as an ordinary machine shop. The forges are of a style designed by the company. They have two openings, one of which is usually kept closed, as most of the work is short. The bottoms are formed of a circular iron casting, on top of which is seated a wrought iron cylinder. Over this a cone is riveted, from the top of which a pipe carries to the chimney. A sliding sheet of iron on the outside serves to close the openings. The fires are placed 12 feet apart from center to center. Three of the fires discharge into one horizontal pipe, in the center of which the smoke-stack is placed.

A 10 x 12 Westinghouse engine is being put into one of the blacksmith shops. The company has six of these engines already at work, and their performance has so far been entirely satisfactory. The windows of the shops are all hung at the top on rollers and have to be raised and lowered by means of guides and latches at the bottom. When it is desired, the entire sash can be slid clear of the window openings. There are no window casings in any of the buildings. Sills are built in the walls and wrought iron lintels at the tops of the windows. The walls are then allowed to settle thoroughly. In large windows such as are usually found in blacksmith shops, the foundation of the settling is sometimes as much as  $\frac{1}{2}$  of an inch in the height of the windows. When the casings are put in when the wall is built they practically carry the weight above them, and their use has been abandoned by the superintendent of the company for this reason.

After the wall is well settled, facing-strips  $1\frac{1}{2}$  or 1 1/2 inches thick are put in, and take the place of the ordinary casing. This is incidentally a great saving of light, since only two inches or so are taken from the width of the window, while the ordinary casing, with the sash in the window opening instead of against it, will take up nearly or quite 12 inches on each side, diminishing the light to that extent. When this method is followed the case of an inside window, the sash is made tight against an inside frame fitted up on the wall, the frame being pointed up in the usual way.

## Apprentices in Locomotive Works.

The following circular, dated Jan. 21, has been issued by the Brooks Locomotive Works, Dunkirk, N. Y.

"From and after Jan. 21 apprentices will be admitted to service in these works under the following rules, and no deviation will be made therefrom:

"1. An applicant must possess a good moral character; must be 18 years of age, with a fair knowledge of the ordinary English branches of education, and write a legible hand.

"2. Application must be made to the office in writing and must be written by the applicant.

"3. An applicant must possess a natural aptitude for mechanics, and have a settled personal desire and purpose to become a skillful and competent workman.

"4. The term of service for apprentices will be three years.

"5. The compensation for the term will be: First year,  $7\frac{1}{2}$  cents per hour; second year, 8 cents per hour; third year,  $11\frac{1}{2}$  cents per hour. Ten hours constitute one day's work.

"6. Apprentices will be required to attend the night school each evening in the week as may be designated for such purpose. Tuition and books are furnished free of charge, and from the date above mentioned attendance in the night school will be obligatory upon all apprentices who enter our service thereafter.

"7. Neglect of this privilege will be considered cause for immediate dismissal from our service.

"8. This company cannot guarantee continuance of service during the full term of apprenticeship, as the ability to do this must be regulated by the conditions of their business, but they will do the best possible for their apprentices.

"9. The following additional circular further expresses the company's intentions:

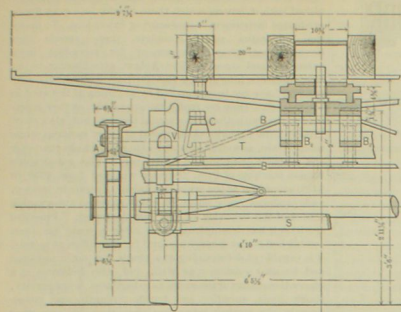
"10. It is the intention of this company to institute a high standard of excellence among their apprentices.

"11. First, by refusing all unfit applications, and second, by using special endeavors to offer them every advantage to become not only skillful and competent workmen, but also to elevate them in the principles and practice of mechanical construction, and afford them opportunities to study and practice elementary mechanical drawing. Hence no applicant will be accepted until a full investigation of his character and elementary education is made.

"12. An applicant must be 18 years of age; must make application in his own handwriting through the mail addressed to our office, and must be prepared to furnish references of his character, education and aptitude for mechanical pursuits.

"13. Applications proving satisfactory upon investigation will be accepted on file in the order of their application, and accepted applicants will be advised when their services are required.

The equipment of the Pennsylvania Railroad Co. for removing wrecks and ameliorating the condition of those injured by such occurrences is the most complete, says the *Philadelphia Record*, of any railroad in the country. The New York division may be particularly mentioned in this connection. There are four wrecking machines along the line, located at Jersey City, New Brunswick, Trenton and Tullytown. Each of these has a wrecking train of five or six cars, which is ready for service at a moment's notice. The first car contains an extra pair of trucks and wheels, frogs, for getting cars on the tracks, hydraulic jacks, pulleys, ropes, chains and fire-buckets. The other car has swinging coats, stretchers, blankets, bandages and every appliance to shelter and minister to the wounded. There are a cook stove, always first up, a disinfectant, crockeryware, provisions and many other articles necessary for hospital purposes.



Cross Section.

Very naturally, until a demand had come which could not be filled by boilers built on the usual lines, there would be very little inclination on the part of master mechanics or railroad managers to adopt anything so radically departing from ordinary methods as the Wootton boiler. At the present time, however, there does seem to be a very decided general inclination on the part of the trunk lines to consider the subject of the wide-fire-box boiler, and to give engines of this kind a fair trial in order to ascertain whether they will give solution of the fast passenger engine problem. In regard to the heavy freight engine, there seems to be little doubt in the minds of railroad men. Judging from figures which are at hand, and from personal investigation, it would appear that the Wootton boiler does give the essential requisites for the fast passenger engine, capable of hauling long, heavy trains at high rates of speed. Instead of a fire-box 33 to 43 inches wide by 9 feet long, a fire-box is obtained having two fire-doors and inside dimensions of 8 feet wide by 8 feet long. This large increase in dimensions produces all the advantages of the trunk line boiler, and the surface to be employed with a consequent decrease in the rate at which the air is forced through the fire. The depth of fire being smaller, and its area being greater, enables the blast to be materially reduced, which in turn reacts on the fire and does away with the blow-pipe flame and its consequent destructive action on tubes and furnace sheets. With large blast-nozzles there is a consequent reduction of back pressure, and the engine gains considerable in power from this cause alone. The large fire-box and the combustion chamber give a material economy in fuel, and properly managed, will enable the master mechanic to get rid of the cinder nuisance without the necessity of having recourse to complicated spark arresters.

Incidentally, many advantageous modifications of the ordinary boiler are obtained, of which it is hardly necessary to speak here. The one point which, above all others, interests the master mechanic, is that with this boiler an almost unlimited amount of steam can be obtained with an evaporative efficiency which would be creditable in a stationary boiler of any of the usual types. The steam supply being assured, every master mechanic knows that it is entirely within his power to design and build a locomotive which will pull the longest and heaviest of his passenger trains at any required speed up to 80 or 90 miles per hour. With the abundant steam supply, the difficulties with the side-rods, journal bearings, steam distribution, and numerous other bug bears, disappear as if by magic, for every builder will feel himself competent to deal with the whole question the moment the question of steam supply is settled and a boiler introduced which does not raise the centre of gravity of his engines.

These remarks have been chiefly suggested by a number of questions asked by master mechanics and others interested in the problem of swift and powerful engines for passenger service. Usually the question of fuel economy has been ignored by the questioner in spite of its importance, the greater difficulty putting the lesser one out of mind. On many roads speed has become so vital that a consumption of 80 pounds per mile has been tolerated as an inevitable disadvantage. This extravagant figure would not be objected to if the engines could handle the heavy trains and make the desired time. Such a rate, coupled with failure more or less complete, is, however, exasperating on all sides.

## Philadelphia &amp; Reading Coal &amp; Iron Co.

This company is making extensive additions to its works at Reading. The shops are plain in their general appearance, but are designed especially for convenience, and in this respect the completeness with which many of the details have been worked out is worthy of mention. Nothing has been done, apparently, from mere precedent, either in external or internal arrangement. The blacksmith shops, of which there are two, are nearly finished.

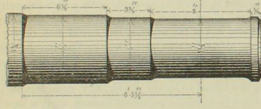


ble wooden window blind and using roller-curtains instead. It would lessen the weight, and give less trouble. "M. C. B." says that the master car-builders should be the inspectors of his own work. This is very true. In my opinion it should be all the same implies—a thorough and practical mechanic, familiar with all the details of passenger and freight car construction, including trucks. He should be competent to design, and to make his own drawings instead of entrusting this most important part to some one who learned to "draw" at school, and knows nothing whatever about the work itself, and as a natural consequence, thousands of dollars are literally thrown away in making changes in castings, templates, patterns and odd sizes of timbers, and time and labor lost in working and erecting the cars, caused by the awkward manner in which the parts are put together. It should be the master car-builder's duty to design the cars and personally superintend the laying out of standard rods and templates, so that the different parts of each class of cars shall be perfectly interchangeable, thereby saving an immense amount of material, labor and confusion, and besides the necessity of carrying a large quantity of surplus stock. If railway managers would take some young man out of a carshop, and give him to understand that if he passes a satisfactory examination in all details pertaining to the duties of a master car-builder, he shall receive the title and position of one, instead of taking men out of machine shops, round-houses, or even out of offices and schools, there would be less complaint about "shoddy construction" and heavy cars, and the expenses of "car departments" would be wonderfully reduced. It is a branch of railway work that must be learned by actual experience, and in order to design a good car the master car-builder should have a "term" on "repairs," which will teach him how to arrange the different parts so they can be removed or replaced when broken without disturbing the other parts.

J. W. P.

### Large Journals.


The cut shows the dimensions of the axle journals, dust-guard bearings and wheel seats, used under some of the big passenger engine tenders of the Philadelphia & Reading road. The journal, as will be seen, is  $4\frac{1}{2} \times 8$  inches, a size which seems rather progressive as compared with that of the present M. C. B. standard for cars. This road, at the time the prevailing standard was adopted in 1873, was using  $4\frac{1}{2} \times 8$  inch journals under its S-wheel coal cars, and since then the size of its car journals has been increased to  $4 \times 8$ , the cars always carrying full loads of 40,000 pounds from the mines to the Philadelphia terminals. Journals of



the size represented in the cut have been running a long time under tenders with tanks holding 4,000 gallons, and weighing 98,000 pounds maximum. It seems obvious that without the large bearings of these journals it would be impossible to avoid heating. When the time comes, as it probably will one of these days, for an enlargement of the dimensions of the standard which was adopted ten years ago, the past and present experience of the above-named road should have some weight in deciding upon a diameter and length of journal sufficiently large to run cool under the prospective heavy loads of the future.

A GENTLEMAN whose comments on men and things are more frequently heard in private conversations than in public discussions, but which nevertheless get a pretty good circulation in one way or another, remarking not long since on the car-wheel discussion at the January meeting of the Car-Builders' Club, said that if our wheel-makers, after 50 years of experience, are not, according to their own admissions, making as good wheels as were made 25 years ago, there was rather a poor show for wheel-makers; and when these wheels are in the market at \$7.50 the makers themselves are ready to admit that the outlook is not promising. And when it is borne in mind that a wreck caused by the breaking or failure of a single wheel often costs more than all the wheels a road buys in a year, it requires some pretty close figuring to discover where the saving comes in from the purchase of cheap wheels.

SOME years ago J. G. Brill & Co., of Philadelphia, built some cars for the East New York Railroad, which were run on the steam extension of the road between East New York and the Grand Street ferry on the East River. The cars were 26 feet long and 7 feet 6 inches wide, were mounted on Diamond trucks with 14 inch wheels, seated 40 passengers and weighed 9,900 pounds each. In consequence of a change in the management of the road their use was abandoned, and two of them are now at the works of the above named firm, being the only ones left of the original lot. These two are apparently in as good condition as when they were new, and aside from the lack of a fresh coat of paint show little or no signs of the two years' service they have had.



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### EDITORIAL ANNOUNCEMENTS.

Addresses.—Business letters should be addressed, and draft and money orders made payable, to THE NATIONAL CAR-BUILDER, 100 N. 3rd St., New York. For the attention of the Editor should be addressed EDITOR NATIONAL CAR-BUILDER.

Advertisements.—Nothing will be inserted in this journal for pay, except in the ADVERTISING COLUMNS. The editorial department will contain our own views and opinions; and the rest of the reading matter, aside from advertisements, will be such as we consider of interest to our readers.

Contributions.—Articles relating to railway rolling stock construction and management, and kindred topics, by these and others, are gratefully accepted. For the attention of the Editor should be addressed EDITOR NATIONAL CAR-BUILDER.

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### LOCAL MECHANICAL LABORATORIES FOR RAILROADS.

At the December meeting of the New England Railroad Club, in Boston, a committee was appointed to report upon the expediency of establishing a joint mechanical laboratory for the benefit of railroads centering in that city. The advantages of a general laboratory organized and maintained by all the railroads in the country, have been frequently discussed, but without any practical results. Whether local or general, however, or whether a few or many roads are to share in the expenses and participate in the benefits, the movement initiated at Boston is deserving of earnest consideration.

A union or joint laboratory conducted by a number of roads having a common terminus must be far more serviceable, more satisfactory and less expensive, than a series of experiments and tests made by individual roads. The apparatus and all necessary appliances will be more complete, the total cost of maintenance, including salaries and fixed expenses, far less; original investigation will be more thorough and the work better done under a co-operative system of management than in any other way provided, of course, that the money that has been expended by some of the leading iron works of the country in demonstrating facts experimentally which had already been ascertained by other establishments of this class by similar expensive methods, would make a very large aggregate, a vast proportion of which might have been saved by a mutual co-operation that would have saved the parties thereto from going over ground already trodden by others.

In making a rough estimate of the mechanical outfit of such a laboratory as is contemplated in Boston, we may say that it should include a good tension testing machine, a Thurston autographic torsion machine, one large oil testing machine, and by preference a small one in addition, and also one or two kinds of special apparatus. A small chemical laboratory is also indispensable, and it may save its cost, perhaps, in a single investigation. The tension

machine will cost from \$1,000 to \$5,000, according to size, fitness of workmanship and the special attachments furnished with it, among which there should be a very finely graduated instrument for measuring extensions. To make the apparatus more complete, there should also be an autographic arrangement for recording both the extensions and stresses. The Abbott attachments to the Fairbanks machine are for this purpose exceedingly useful, and have not been equalled by anything of the kind in the market. They are really indispensable, as they represent to the eye not only the actual figures, but also show instantly the behavior of the metal at every moment while under strain, as well as a great deal in regard to its character and probable endurance in actual use. The autographic torsion machine of Prof. Thurston will cost from \$350 to \$450, according to the style and finish. It tests by torsion, and produces on a sheet of ruled paper an autographic record of the behavior of the sample tested. Practical work on it has demonstrated that after a scale has been established for each machine and for the different metals, it is capable of determining at a single test both torsional and tensile resistance as well as, and also indicates at the glance the quality of the metal as to hardness, homogeneity, elastic limit, ductility and tensile strength, and consequently the testing takes less time than by any other machine now built. The specimens for testing are of shapes that are easily and quickly made. Work can be so quickly done upon it that one man can test every lot of iron brought by a half dozen rods in their regular work, as well as most of the bars wanted by special service.

The large railroad oil-testing machine costs from \$450 to \$500. This is furnished with a full size M. C. B. standard journal, upon which the tests are made. The small machine costs about \$200, and on account of its usefulness for a variety of experiments it ought to go with the large one. For incidentals, and for minor apparatus which can be picked up from time to time \$500 may be set aside.

The chemical laboratory may be started on \$1,000. It should, however, take shape and grow with the work. If a chemist is employed the laboratory can be extended with profit to all concerned. If, on the contrary, the superintendent's tastes lean toward mechanical work, the chemical department will remain in an embryonic condition and will be little more than an incidental. For office furniture, it will be necessary to allow at least \$350.

These figures represent a minimum, and will foot up to anywhere from \$4,000 to \$8,000. Probably for about \$8,000 a very good start could be made, with such contributions from the roads of work and apparatus as would not be charged against the laboratory.

The next question, and the most important of all, is the man for a manager. In securing one two policies may be pursued, either of which has the sanction of precedent. The first is to get a young man on a salary of say \$1,000 per year, let him experiment and do what he is told to do. He will do fair work, and the roads may be satisfied for a time. Just as soon as the man has learned something, and has become of some value, he will depart, leaving the roads to get some other young man to educate. The laboratory will gain a reputation for turning out first-class experimental lists, and the roads will have the advantage of paying small salaries, of being good schoolmasters, and of fitting men for positions on more liberal scales. The second is an object, which, however, is very doubtful in this regard, they can get a young man of promise for \$1,500, and he can be kept if he is given to understand from the beginning that a steady increase of salary will follow, and that he can have a permanent position if he has the requisite ability. He will have an inducement to be useful, and it may be worth the while of the roads to try and educate such a man. The wise way, however, is to get a man of experience at the head of such an institution, and then the results will be of such a character that the investment will pay from a monetary standpoint. Looked at from the side of experience, such a man is of more importance than the machinery, and would do more without the apparatus than a young and inexperienced man would with it.

### JOURNAL-BEARING METALS.

A correspondent wishes to be informed if there is any combination of white metals sufficiently hard for car and locomotive journal bearings, and at the same time of such texture as shall be capable of standing up to the wear of the axle. In reply we would say that no journal bearing can be made that will not heat in running under some circumstances. If the pressure is increased until cutting begins, or if the lubrication is defective, it will be impossible for the journal to run cool, no matter what the composition of the bearing may be, or whether the metal is white or copper color or yellow or steel color. We suppose, however, that our correspondent merely wishes to know whether a white metal can be made for the purposes named, that will always run cool with a fair load and proper lubrication, and to such an inquiry we think we are safe in saying, yes.

One of the first white metals successfully used as a bearing was that invented by Mr. Jesse Babbitt, of Boston, and familiarly known to the mechanical world as "Babbitt metal." As made by the inventor it consisted of an alloy of copper, tin and antimony, and although white in color is, we suppose, properly classed as a bronze. Mistaking



the color of the metal for a true indication of its character, zinc and lead mixtures of various kinds were for long used in the place of it, and their poor performance three discredit for a long time on a great variety of very valuable alloys. Our correspondent asks his question as though the hardness of the bearing was the essential condition upon which the cool running depended. This is a mistake, as every manufacturer of journal bearing metal very well knows. Whether the metal be a white or yellow brass, a bronze, or a white metal, there is a very great variety of properties which must be combined in order to produce even a passably good bearing. After going through the whole subject of the composition of metals suitable for bearings the conclusion at last is that the man who makes a metal, or the man under whose direction it is made, is frequently the most important factor in the composition, and the one on which its value depends. Almost any one who is familiar with the subject can cite cases where a thoroughly good recipe, in the hands of inexperienced persons, has been made to produce a worthless metal; and, on the other hand, can also cite cases in which a second-class combination has been productive of excellent results in the hands of those who understand the handling of metals in the crucibles. An exhaustive treatise on this subject would include the inside history of all the best metal foundry practice in the country. Probably no subject in the range of metallurgy is so complex as the mixture of metals for special purposes.

The laws governing metallic combinations are little understood, and each individual must find out for himself, in a practical way, how to proceed in order to achieve success. To illustrate the difficulties which beset the young founder who proposes to undertake the manufacture of journal bearings, we need only refer to the experience of the great brass companies in the manufacture of brass and other alloys of copper for the market. These companies, although they have the experience of the best workmen and unlimited facilities, can not produce with any certainty, grades of metal which will stand the requirements of carriage making. Even in lots of other, wise perfect metal, there will be pigs which will utterly fail to stand the required tests. Sometimes whole lots made with the greatest care will have to be rejected as not coming up to the standard. The why and the wherefore is as inexplicable to manufacturers as to outsiders. Mr. Hobbs, the Superintendent of the Union Metallic Cartridge Co., of Bridgeport, Conn., recently gave an interesting account of a lot of metal, which, after standing every test, and being made up into cartridges, gave infinite trouble months afterward. The finished cartridges, when being packed away in boxes, were found to be dried. The heads dropped off or cracked away from the bodies. The reason for this no one was able to discover, nor was any light thrown on the subject by an investigation of the details of the manufacture of this particular lot of metal. When such difficulties are encountered by those of the longest experience, it is little wonder that the inexperienced manufacturer, with scanty facilities, finds himself unable to produce perfect quality of metal, and that perfectly uniform as could be desired. We look upon the tendency of railroads to depend on manufacturers for their bearing metals as a favorable sign. Except under very favorable circumstances railroad foundry mixtures can not compete in quality with pig metal obtained outside.

#### APPRENTICES AND MACHINISTS.

We copy elsewhere a circular recently issued by the Brooks Locomotive Works, setting forth the terms and conditions upon which apprentices will be received in that establishment, and the privileges and advantages that will be extended to them during their term of service. The system outlined in the circular is, as we understand it, a revival of the old-time system of apprenticeship which has practically ceased to exist, but the adaptation of this kind of service to the requirements of modern progress in the sphere of mechanics. It proposes to educate apprentices to be something more than mere appendages to machines, with their range of intelligence bricked up within the narrow limits of routine, and with no opportunities to become proficient in a wider knowledge of the principles of construction, including drawing, designing and a thousand other things in which the old-time mechanic was comparatively deficient.

The demand now is not so much for machinists who are skilled in all the details of hand-work, as for men who are capable of taking the position of foreman and of devising means and appliances by which routine work can be done by unskilled labor at low prices. Such men are no longer required to work drill-presses, as in former times, but have been advanced from the grade of mere workmen to something higher, where brains as well as hands are called into requisition. They can devote more time to the abstract and theoretical, and less in acquiring mere manual dexterity, which is not necessary now to attain perfection in the general product of machinery as it once was. Special tools and machinery are wanted now nowadays, the improved devices of one year supplanting those of the previous year, and thus stimulating a demand which brings to the front a class of workmen much superior to those of the old apprentice system, men who are inventors and originators, who devise geometric lathes for bank-note engravers, spe-

cial tools used by jewelers, gun makers and sewing machine manufacturers, and a thousand specialties for abridging hand-labor and turning out more perfect work. The modern machinist must to a certain extent be a tool maker.

In the repair shops, however, the man is still valuable who can do anything and all things without tools or with them, who would not hesitate to undertake a job with such tools only as a blacksmith or carpenter can make, who can turn 40-foot bolts on home-made lathes, and cut screws on them also. Such men can in some cases cut a key-seat quicker by hand than boys can with a key-seat slotter, but their per diem wages are as much, perhaps, as the weekly pay of the boys. A boy can make with the machine slot after slot that will take machine-made keys that are interchangeable, while a man by hand-work can not perhaps make two that are alike, unless at a much greater cost.

The system inaugurated by Mr. Brooks is timely, and meets an imperative need which is beginning to be felt more widely from year to year. It looks to the moral and intellectual improvement of employes, inspires them with hopes of promotion as a reward for diligence, instead of stifling their minds dwarfed and narrowed by a system of rigid routine, prevents employers and employees from having anything more than a nominal identity of interest.

#### NARROW GAUGE.

The mania for narrow-gauge roads which was so prevalent ten years ago has practically died out. At all events, there are not so many labored articles floating about in the newspapers, abounding in detailed estimates of the cost of construction, equipment and operation, with the inevitable summing up of the totals, and the subtraction of the smaller or narrow-gauge sums from those of the longer or broad gauge, the difference representing an immense amount of capital thrown away by adhering to a costly mistake of 20 inches or thereabouts in the width of track. The arguments, it must be admitted, were strong on both sides, but the wide gauge advocates had possession of the field at the start, which was a great advantage. They really have no reason to exult because the weaker party, of between 4 and 4.81, went to the wall. The victors themselves have been forced to take in a good deal of sail by the narrowing of thousands of miles of wide-gauge track within the past few years, and the work is not through with yet. They can not with decent propriety vaunt their superior wisdom and foresight by saying "I told you so," because they very well know that if the first hundred miles of a world-wide system of railways were to be built the coming summer, and it were necessary to determine what should be the most suitable width of track as respects utility and economy for all time and to the fraction of an inch, they would probably not be able to do anything more or better than to get a large number of engineers and scientific men to guess at it, and then average the guesses.

Whatever the merits of the so-called narrow gauge it can not be per se, as it always has been compared to and yielded to the force of circumstances and go with the current. A single railroad in a vast network of railroads must be an integral part of the whole, as much as a vein or artery is of the human body, and can not remain isolated from the general system without injury to its business. A narrow-gauge road like the Toledo, Cincinnati & St. Louis, for example, is naturally interested and bound up by its bonds of standard gauge. It is among them, but not of them, but no more so than if it were a standard gauge in the midst of narrow gauges, unable to interchange traffic with its neighbors without transshipment or the changing of trucks. The track of this road is, however, about to be changed so as to conform to the standard width.

#### THE NEED OF MORE SHOP ROOM.

There is a yearly, if not a daily, increasing need of more ground space for railway shops. Many of the present ones have been located in places convenient enough as respects contiguity to the line, access to fuel and water, and the like, but the space originally allotted to them and are now cramped both for shop and yard room. Inside the shops the workmen in their routine of duty are almost as much restricted as to room as are the movements of a lot of boys or soldiers sleeping "spoon-fashion." If one man wants to turn round he is sure to be in the way of the next man, unless all turn at once by platoons and by the word of command.

The car and locomotive shops of a certain prominent road were located many years ago between its main track and a river. At the time the available space seemed to be ample, but now the shops crowd the track and river so closely that there is hardly room on either side for a man to pass, and the river has been filled in a hundred feet. The shops of another road were located in a somewhat similar way, with the main track on one side and an important highway, distant about 250 feet, on the other. The increasing business of the road, and the need of yard room for cars, engines and materials, have long ago made use of all the original space, and the work is now done under great disadvantages. A removal of these shops of another place will be attended with great expense, yet this will be the cheapest way out of the trou-

ble. The present shops, although equipped with the best machinery and appliances, will have to be abandoned, so far as their present uses are concerned, just because it is impossible to obtain the necessary ground for their enlargement. There are so many cases of this kind on our older roads as to make it unnecessary to particularize. Within the next few years many of the leading lines will be compelled to remove large and costly shops in order to get more room, while other lines will have to enlarge and extend their present shops very materially.

In the planning of new ones several very important things should be kept in mind. They should be arranged so their superintendence will be easy. This, perhaps, is best provided for by having the office of the superintendent located centrally, and spreading the various parts of the establishment around it. The next consideration is the tendency of the business, and consequently of the shops, to grow, making it necessary to have more available room on the outside, or circumference. In the internal arrangement and relation of the shops with each other, the direction in which the work is to move, and the facility of transfer from one department to another, are matters of the first importance. There is plenty of space the spider-web plan will be found the most convenient in many respects. Growth would then always be radial, and the movement of the work would be practically around a circle. The superintendence would be from the center, and the cars, as they approach completion, will always be traveling in one direction, making it easy to provide gravity transfer-tables from shop to shop. There is one thing that every car-builder will doubtless be anxious to avoid, and that is the necessity of having several cars on one track in the repair house, in which case three or four of them must be moved in order to get one of them out of the way. On the other hand, very short tracks are not desirable for the reason that they become very inconvenient when cars are increased in length. In one shop which might be named, it is now necessary to transfer a passenger car in many orders to remove the trucks and get the car ready for painting, a proceeding which involves an amount of labor and time quite out of proportion to the result to be accomplished.

#### CIVILITY AS AN INVESTMENT.

A dozen years ago the president of one of the leading railways terminating at New York city took pains to impress upon the minds of the employes of the road the necessity of being civil to its patrons. The reasonableness of the admonition was duly heeded, and the result was a very perceptible increase of business, especially in passenger traffic. The road not only held its own against competing lines and vigorous competition, but, in cases of accident and the award of damages for injuries sustained, juries were inclined to be lenient instead of improving the opportunity to punish a "soulless" corporation for a multitude of petty annoyances caused by the rudeness and incivility of its servants in the performance of their duties. The prevailing discipline on a road has much to do in securing the good will of the public, and this good will, in railway business, has a positive money value which should not be underestimated. Unless the conduct of employes is subjected to wholesome supervision they are apt to become rude and disrespectful, and this very naturally excites prejudice against the road and its managers. If its business is injuriously affected in a corresponding degree.

It may be said, of course, that there are two sides to this matter, that passengers in railway cars are made up of all sorts of people, some of whom stand as much in need of the restraints of discipline in their conduct and demeanor toward others as the most crusty and self-sufficient conductor or brakeman. This is very true, but they do not constitute a very large portion of the traveling public, and any little friction that may occur between them and the trainmen does not lay the foundation of a grudge to be nursed until they get on a jury in a suit where the road is a party, especially if the passenger is consciously at fault. It is notorious that in the matter of damages claimed or recovered from railway companies under various pretexts the amount is often paid in full, and that the law tends to inflict punishment on corporations of this class has more to do with it than any abstract considerations of right and justice.

Taking a broader view of the subject, and regarding a railway corporation as a chartered public convenience, its relations with the community are somewhat different from those which exist between the managers of a private business enterprise and its patrons. The owners of a railroad, or, in other words, its stockholders, have no interest in it, as individuals, aside from its capacity to earn money and make a return on the investment, and the road can earn money legitimately only by performing a public service. Its ability to earn depends altogether on its ability to furnish people with transportation facilities. There must be a reciprocal give and take, otherwise no benefit results to either party.

In railway operation, however, there is necessarily more or less friction, mental and moral, as well as mechanical. There are a great many little things that are regarded as matters of course by the roads, and as inevitable annoyances by the public, but which are the nature of the inevitable on the part of the road management and so far detrimental to its interests. Backing a train half way







people who are not only indifferent in regard to these subjects, but deplorably ignorant. Published by John Wiley & Sons, 15 Astor place, New York.

**Cold-Punched Steel Nuts.**

Messrs. Hoopes & Townsend, of Philadelphia, have sent us some samples of cold-punched steel nuts of their manufacture, and, for perfection of thread and beauty of finish, are quite remarkable. These nuts are made from the smallest size up to two inches in diameter. We have also received from the same firm an example of cold punching, consisting of a steel block 1½ inches thick, with a hole ½-inch thick through its center as smooth and as perfect as if it had been drilled, except that it is not quite round. At the top, the hole is .478 of an inch in diameter, while the core is .459 of an inch at the upper part. Although the hole is 1.75 in. long, the length of the core is only an infinitesimal fraction over ½ of an inch, showing that in deep punching, contraction in length takes place in steel as well as in iron.

The cold-punched iron nuts made by this firm have long been a wonder to mechanics on account of their accuracy, strength and beauty of finish. Under test, they have a remarkable power of resistance, not only against stripping but also against bursting strains. The specimens of steel nuts referred to are case-hardened.

The cylindrical steel passenger car now being built at the Atlantic works in East Boston is decidedly unique in its general design as well as in many of its details. Sheets of steel running lengthwise of the car are curved to fit upon the frame of ribs and keelsons, making a cylinder ten feet in diameter and fifty-four feet in length. The space between the metal floor and the lower inside surface of the cylinder is utilized for heating and ventilating the car.

Messrs. HILLES & JONES, of Wilmington, Del., manufacturers of iron working tools, have just issued a handsomely illustrated catalogue of their machinery and tool products, which is worthy of the attention of purchasers. This firm have made the manufacture of tools for locomotive work a leading specialty, among which is their heavy vertical milling machine, one of which will do a large amount of work, economically, that is now done on slotting machines at great expense. The catalogue contains 100 pages, the machinery engravings are excellent, and the letter press equally so.

The firm of W. D. Wood & Co., of Pittsburgh, manufacturers of common and planished sheet iron, has been dissolved, and reorganized as W. D. Wood & Co., Limited, the members being the same, viz: W. Derwood Wood, Richard G. Wood, Alvan W. Wood, and Thomas D. Wood.

Mr. JAMES H. LANCASTER, President of the Lancaster Manufacturing Co., has purchased the plant, patterns and good-will of the business of J. H. Darlington, corner of Centre and Franklin streets, New York City. Mr. Lancaster will add additional machinery and will build his new patent cable motors and pumping engines, drop and trip lammers, dynamic machines, steam engines and similar work, and will also do most of the work of the Lancaster Manufacturing Co. The business will shortly be turned over by him to a joint stock company, to be known as the J. H. Lancaster Engineering Co., with a capital stock of \$500,000. The business is distinct from that of the Lancaster Manufacturing Co., of which Mr. Lancaster is President.

A RAILROAD was building in Chihuahua, and the contractor advertised for a large number of railroad ties. A Mexican answered the advertisement in person.

"How many can you supply?" asked the contractor.

"Excelencia can have as many as he wish," with an expressive shrug of the shoulders.

"Well, if we should want five hundred, what would they cost us?"

After much figuring the Mexican replied that he could furnish them at 50 cents, American money, each.

"And suppose we should want 5,000 of them?" said the official.

"Bolsa me Dios!" cried the astonished native; "that is a very immense order." And he figured, and concluded that he would have to charge 50 cents each.

"Well, sir, we want at least 500,000 ties," said the contractor, while a look of surprise and astonishment overspread the Mexican's face, and after more pantomimic calculations, the native solemnly announced that for "such an immense order, such an unheard of quantity, he would have to charge at least \$2 apiece for the ties!"

A WAG went to a railroad station one evening, and finding the best car full, said in a low tone, "Why, this car isn't going." Of course, this caused a general stampede, and the wag took the best seat. In the midst of the indignation, the wag was asked, "Why did you say this car wasn't going?" "Well, it wasn't there," replied the wag, "but it is now."

THERE was an old couple at the Central depot yesterday, waiting to go through to the West, and they seemed loving enough until the old man went out and returned smoking a five-cent cigar and with his hat slanting over his left ear. The wife looked at him and said, "What do you think of him, and then opened her mouth, and said, 'What do you think of him, Philletus Remington, before we left New Jersey? Didn't I say you'd go and make a fool of yourself? The first cigar cost only five cents; but she shouted, 'You bought the cigar and tea and a lot of things, and you gave your boots blacked; then you wanted some soda-water; then you bought apples on the train; and here's another five cents thrown away; then my name ain't Sary.'

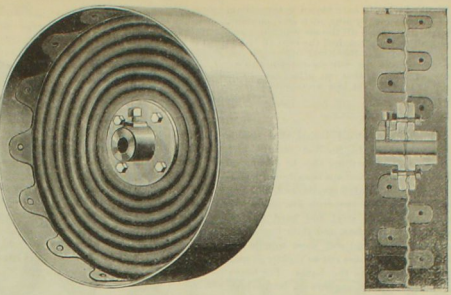


Fig. 1.

THE FULTON STEEL PULLEY.

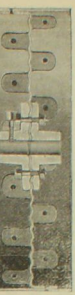


Fig. 2.

Mr. CHARLES GRAHAM, master mechanic of the Delaware, Lackawanna & Western shops, at Kingston, Pa., recently turned out a new mogul freight engine, which is the eighth of a class of engines he is building, and of which he has three more under way. The cylinders are 18x24 inches, the driving-wheels are 31 inches diameter. The boiler is of Otis steel, the fire-box sheets are corrugated and are 10 feet long, the width of the fire-box being 34 inches. There are 188 flues 2 inches outside diameter and 11 feet 6 inches long. These engines burn anthracite coal. It is reported that the Baldwin Locomotive Works have closed contracts to furnish 120 locomotives for Russian railways.

MR. MILHEAM, of the New York, Lake Erie & Western road, at Jersey City, has just finished two very handsome day coaches. The inside work is all of the brightest selected ash, with mahogany trimmings, relieved by small panels between the windows, of mahogany stained to a darker tint. The coaches are 52 ft. long on the frame, 9 ft. 8 in. wide, and have seats for 84 passengers. They have two floors on top, one of which is diagonal, and are sheathed up underneath, the sheathing being cut in between the sills, which are 54 by 8 in., with intermediates of 4 by 8. The windows are of the latest style and have 20x30 in. glass. The head-lining is of wood, and the whole roof is not only light and airy in appearance, but is also light and strong in construction.

The cuts represent a new and improved pulley patented by Harmon H. Fulton and Christopher Olsen, both of the Indianapolis Machine and Bolt Co. The appearance and peculiar construction of the pulley are very well shown in Fig. 1. It consists of three parts, the rim, center and hub. The rim and center are of steel and the hub of malleable iron. The center, or die, is corrugated, which gives immense additional strength to the pulley. The corrugations may be concentric as in the cut, or radial as may be desired by users.

The corrugating of these dies is done by a powerful press made especially for the purpose. The sheet of hot steel is placed in the press and the die brought down with great force, not only corrugating the disc, but punching out every alternate "ear," by which the rim is afterward to be made fast. The withdrawal of the die pulls up the other alternate ears, thus by one operation leaving the center fully corrugated, and the ears bent alternately to one side and the other ready for finishing. The rim is drawn around the center disc while cold by powerful machinery, and then riveted to the ears. The place of meeting of the two ends of the rim is a double joint, and the space of each half being cast in the periphery of the pulley.

The hubs cast in two halves, the faces of each half being cast with a corrugation to fit snugly to that of the steel disc. The two halves of the hub are placed in position and bolted firmly together through the disc.

Fig. 2 is a sectional view, showing the method of joining the parts, and the form of the corrugations, with the alternate ears on either side riveted to the rim. The rivet holes are punched and the riveting completed while the pulley is in the chuck, so that when it is released the pulley is made. The hub is also shown with its corrugations closely hugging the disc and held there by the bolts. The pulley can be made up to 5 feet in diameter. In the larger size a double die is used to give additional strength and stiffness.

The advantages claimed for the Fulton are: 1. It is lighter than any other metal pulley now in use, having only about half the weight of the lightest of these. 2. It is fully as strong in doing its work, and is absolutely free from any danger or breakage. 3. It is perfectly balanced from the moment the rim is drawn into position. 4. The lightness of the pulley admits of a far lighter hanger, thus decreasing cost this way. 5. The friction is greatly reduced, enabling a lighter shaft to do the same amount of work. 6. A great saving of labor is effected by using the Fulton pulley, when placing it in position, because of its extreme lightness. The pulley may also be made either crowing or flat, and to run vertically or horizontally, as occasion may require.

One of these pulleys, 30x12, was tested by being put on the main shaft of the works of the above-named company, in place of a 38x8 pulley. The belt was not even let out to allow for this difference in size, but was forcibly stretched on just as it was. So great was the strain that one side of the lacing burst, and it took the combined strength of five men to put the belt on. Yet the pulley sustained the strain with no sign of giving. It was at once put to work, and drove two large Stuartian fans, two belt cutters and a couple of tappets with perfect ease.

The Fulton pulley will be manufactured by three well known firms in the United States, the Indianapolis Machine and Bolt Works, Indianapolis, Ind.; the John T. Noyes Manufacturing Company, Buffalo, N. Y., and the Falls River Company, of Cuyahoga Falls, O.

**A Vagabond Freight Train.**

The following account of the progress of a freight train from the Harlem River to Chicago is from a Springfield, Mass., paper, dated a few years back:

"There were ten platform and four box cars drawn by two engines, one being from the Long Island South Side and the other from Pennsylvania Railroads, and bound for a Nova Scotia railroad for further service. The entire trip was a chapter of ridiculous casualties. They had a box every mile, were in everybody's way and got the boiler so full at New Haven that dirty water was shed from the stacks all over the engineer, who made a few appropriate and evangelical remarks. Out of New Haven the head-light expired, when the fireman proposed connecting the headlight with the smokebox and using the coal gas for illuminating. At Yalesville the fuel followed the headlight and rail fences were ruthlessly used to ground steam, this taking an hour, which the engineer improved by fishing off the bank for crabs, and, with perhaps 60 pounds of steam, the train shoved ahead with one engine, after a lively fight with local grangers for more fence-rails. The steam gauge were broken, and lamps gone, and both driver and fireman went it blind in the dark. The brakemen say they stopped at every gypsy camp to wake the folks up with blasts

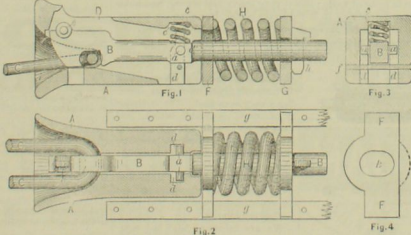


Fig. 1.

THE ARCHER AUTOMATIC CAR COUPLING.

This device appears to have some of the important requisites that are considered indispensable for the coupling of cars in a satisfactory manner. The arrangement of the parts is such that the coupling is performed automatically; the draw-bar is entirely relieved of any draft or pulling strain, all of which comes on the draw-bar and buffer spring; no coupling pin is used, nor is there any risk of buckling the draw-bar or coupling link. The uncoupling is done from the top or side of the car. The peculiarities of the construction are shown in the cuts.

Fig. 1 is a longitudinal section showing the position of the parts when the cars are coupled. Fig. 2 is a horizontal section. The buffer head A is of the usual pattern in its outward appearance. The draw-bar B has a hooked end, and is held in position by the lug C which works up and down in grooves D. Over the lugs is a small spiral spring E, which, with the lugs and grooves, forms a toggle joint upon which the draw-bar oscillates independently of the buffer-head. The hook has an inclined face so as to slide easily over the link in coupling, and on top is a lug to which a chain may be attached through the opening D for raising the hook when uncoupling. Fig. 3 is a cross section, showing a rivet or bolt F is shown, holding the draw-bar in place. Fig. 4 is a front view of follower plate F, containing an oblong slot in which the draw-bar can move up or down in coupling or uncoupling.

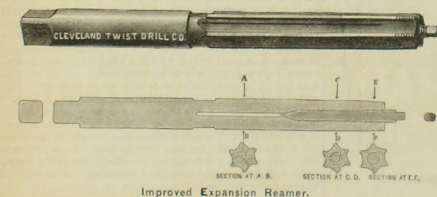
This coupling is in use on a large number of the cars of the Delaware & Hudson Canal Co. The total weight of the draw-bar and buffer-head is about 180 pounds, and the cost of the apparatus is about \$5 more than that of ordinary draw bars. It has been fully tested on this road, and its performance has met with unqualified approval. The inventor is Mr. R. B. Archer, of Saratoga Springs, and the device is manufactured by the Archer Automatic Car Coupling Co., of the same place.



from the most diabolical whistle ever blown in the valley, and that the gypsies came out, young men and maidens, old men and children, and swore till the air was blue, and threw stones. When this train reached the city all hands sang the doxology, and advised the River road engineer, who took charge, to watch the wheels carefully to see which way they moved, and that an attachment was coming on for stolen fences. At last accounts the train had got to Chiopee."

A BRIGHT and well-known mechanic insists that on his swiftest moving journals he obtains the best results with cast-iron on cast-iron, and he is willing also to depend on an emery-ground fit. Another, perhaps equally authoritative, says that for exceptionally high speeds, as 4,000 revolutions per minute, cast-iron and cast-iron are inadmissible, but he employs untempered steel and hard Babbit metal well hammered into the box and then bored out. He tried hardened-steel boxes and soft steel spindle for that speed, and found that the boxes cut so rapidly as soon to destroy the spindle as well as the boxes. For heavy weights and large journals there appears to be nothing that gives better satisfaction than good Babbit boxes hammered solidly. Cast-iron boxes with wrought iron and steel spindles have done well where the weight and speed are not excessive. All soft metal bearings, as Babbit or composition, ought to be protected from the grinding influence of dust, but cast-iron, if kept well oiled, soon forms a glaze that is almost indestructible. In all cases the journal should give space enough for a film of oil, especially for high speeds under which it may become heated and slightly expanded. Many journals and boxes are injured by binding, the consequence of a too fine fit.—*Age of Steel.*

A HODGMAN drop-table is in use at the shops of the P. W. & B. Railroad, at Wilmington, Del. The cost of the table and pit was about \$1,500, and much of this was due to the digging of the pit in made ground, where it was difficult to keep out the tide water. The convenience of the apparatus can be appreciated more fully by those who have been accustomed to jack up locomotives in order to take out wheels and trucks. Two instances of its usefulness in this respect may be noted: A truck was in one case taken from an engine, a pair of wheels removed and new wheels put in, in three hours, the engine going on to the table at the end of a run at 4 o'clock p.m., and at 7 o'clock went on the truck again to take her train. A pair of wheels have been taken from a passenger engine in one hour; and under very favorable circumstances a pair of truck wheels have been removed and replaced in 35 minutes. The operation of the table is quite simple. A pair of heavy bars are placed across the engine under the frame, and a pair of jack-screws, mounted for the purpose, are placed under the ends of the bars, and the nuts are run up until the bars take a bearing. The table is then lowered and the truck removed or drivers dropped with the greatest ease. The truck can go out without touching the pilot.

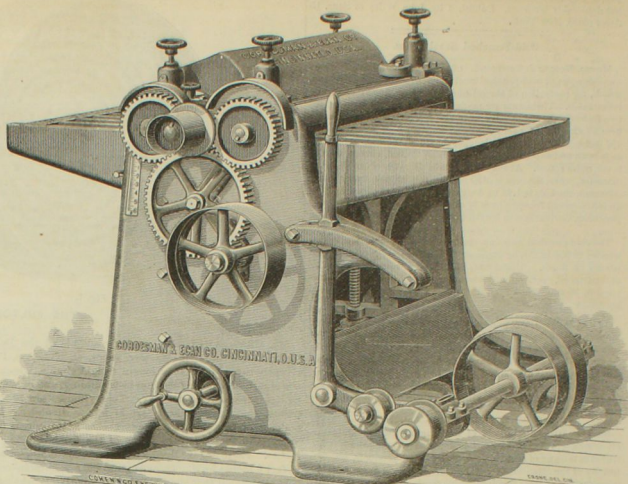


Improved Expansion Reamer.

The cuts illustrate an improved expansion reamer manufactured by the Cleveland Twist Drill Co., at Cleveland, Ohio. Fig. 1 is an outside view showing its general appearance. Fig. 2 is a longitudinal section, and three cross sections at different points are also shown.

These reamers are made of all sizes from  $\frac{1}{4}$  inch to 3 inches in diameter. Those less than 1 inch have six flutes, and are saved into the center in every other space, so that when set out by the tapered pin or plunger all the flutes will cut. Its construction is shown quite clearly in Fig. 2. A small hole is drilled in the center, from the point, running back the whole length of the flute. This hole is then counterbored, one half of its length terminating with a long taper in the center of the length of the flute. The outer end of the hole is then tapped out with a fine thread. The expanding pin, or plunger, is turned down to the bottom of the thread before it is hardened, allowing it to slip in nearly up to its place before the threaded part engages with that of the reamer. The reamer shown in the cuts has a very valuable feature in the form of a patent screw or self-feeding point. When required the reamers are furnished with a pilot, that is, a cylindrical and not fluted, and ground up true to the proper size for the hole to be drilled. As this pilot just fits the hole it keeps the reamer straight and prevents any tendency to wobble.

The special advantages claimed for this device over other expansion reamers is the simplicity of its construction, the ease and quickness with which it is expanded or contracted, the absence of loose pieces, and small liability to get out of order. It is in use in many of the best machine shops and factories in the country, and is strongly approved for its reliability and practical usefulness. Price lists and other particulars furnished on application to the company, as above.



NO. 3 PLANER AND SMOOTHER—Pressure-Bar on Each Side of the Knife.

The engraving represents a new and improved machine, designed and built by the Cordesman & Egan Co., of Cincinnati, Ohio, for the smoothing and planing of all kinds of hard and soft wood. It is intended to be run in connection with the company's Double-Drum Sand-Papering machine, which was illustrated and described in our September issue. A machine for this purpose must do the very best work in order that the wear on the sand-paper in the last-named machine may be as little as possible. The frame is strong and solid, and is specially designed for great stiffness. The table raises and lowers in planed slides in the sides of the machine. The slides are gibbed in such a manner that any wear or vibration can be instantly taken up by screws on the outside of frame. A pressure-bar is placed in rear of head, so that the lumber is held firmly as it comes from knife. The patent block, which covers head, has an extension which comes down in front of knife; this is very heavy and strong, and holds the board firmly as it is fed to the cutter, thus forming a combined pressure-bar and chip-breaker. The feed is very powerful and steady, and consists of four 5-inch rolls, and has two changes on cone. Can be instantly started and stopped by lever on side.

Feed rolls receive pressure by spiral steel springs, and any pressure can be instantly given them by turning a very even feed. The cylinder is of steel, is double belted, and runs in very wide self-lubricating boxes lined with best Babbit metal. The planer is made in two sizes, to plane either 24 or 30 inches wide, and 6 inches thick. The tight and loose pulleys on countershafts are 12 x 6 $\frac{1}{2}$ , and should run 930 revolutions per minute.

We are informed that the company have a great many of these machines in operation. One of them was in the recent Cincinnati Industrial Exposition, and attracted much attention. The manufacturers may be addressed, as above, for cuts and prices of any other wood-working machinery.

## Our Directory.

We note the following changes since our last issue. Our readers will do us a great favor by giving us prompt notice of any changes that may come to their knowledge or of any errors that may be noticed in our list:

**Atlantic & Pacific.**—Daniel Hardy has resigned the position of Division Superintendent.  
**Chicago, Milwaukee & St. Paul.**—J. J. Underwood is appointed Superintendent of the Sioux City & Dakota Division.  
**Baltimore & Ohio.**—L. Packard has resigned the position of Master Car-Building to accept a similar position at the West Albany shops of the New York Central road, made vacant by the resignation of H. Holt.  
**Chicago & Northwestern.**—W. Hutchinson has been appointed Master Mechanic in charge of the shops at Council Bluffs, Iowa.  
**Cincinnati, Columbus & Hooking Valley.**—Thomas W. Hanna has been appointed Receiver of this road.  
**Cincinnati, New Orleans & Texas Pacific.**—J. W. Fowler has been appointed Master Mechanic of the New Orleans & Northwestern Division, with office at Meridian, Miss.  
**Cleveland, Columbus, Cincinnati & Indianapolis.**—William Garsting has been appointed Master Mechanic of the Columbus Division, with office at Cleveland, O. in place of W. L. Gilmore, resigned. J. K. Lape has resigned the position of Master Mechanic of the Indianapolis Division.  
**East Tennessee, Virginia & Georgia.**—J. E. Wilcox has been appointed Purchasing Agent, vice W. A. Harrison, resigned.  
**Florida Central & Western.**—M. Davidson having resigned as General Manager, D. E. Maxwell has been appointed to take charge of the road as General Superintendent.

**Lake Shore & Michigan Southern.**—The office of General Master Mechanic has been abolished, and George W. Stevens, successor of James Sedgley, takes the title of Superintendent of Motive Power.

**Little Rock & Fort Smith, and Little Rock, Mississippi River & Texas.**—F. A. Lister has been appointed General Superintendent of both these roads, in place of Theodore Hartman, resigned.

**Louisville, Evansville & St. Louis.**—George T. Evans has been appointed General Manager in place of Webster Snyder, who goes to the Gulf, Colorado & Santa Fe.

**Louisville & Nashville.**—O. M. Dunn has been appointed Superintendent of the New Orleans & Mobile Division.

**Mexican National.**—F. A. Lister having resigned the position of Superintendent, C. A. Merriam has been appointed Superintendent of the line from Corpus Christi to San Antonio, and of the Matamoros Division.

**Michigan & Ohio.**—H. H. Mitchell has been appointed Purchasing Agent, with office at Toledo, O.

**New York Central & Hudson River.**—D. Hoff has resigned the position of Master Car-Building at the West Albany shops, and has accepted a position with the Gilbert Car Manufacturing Co., Troy, N. Y.

**New York, Lake Erie & Western.**—B. Thomas has been appointed General Superintendent in place of E. S. Bowen, who has been elected one of the Vice-Presidents of the company, vice Robert Harris, resigned.

**New York, West Shore & Buffalo.**—Chas. D. Gorman has been appointed Assistant General Superintendent in place of E. E. Childs, who will nevertheless give his whole time to his duties as General Superintendent of the New York Ontario & Western.

**New York & New England.**—S. M. Felton, Jr., has resigned as General Superintendent, and Ross Keels as Superintendent of Motive Power.

**Oregonian & Nosherville.**—W. M. Newbold has been appointed General Superintendent, in place of O. M. Dunn, who has gone to the Louisville & Nashville.

**Pittsburgh.**—George F. Jones succeeds L. E. Clark as Auditor and Purchasing Agent.

**Pittsburgh & Western.**—W. M. Flahavahan has been appointed Master Mechanic, in place of Charles Kennedy.

**Richmond & Danville.**—Edward Berkeley has been appointed Superintendent of the Atlantic & Charlotte Air Line Railway.

**South Pacific Coast.**—George Revett has resigned the position of General Superintendent.

**Utica, Rhine & Elmira.**—George S. Sailer has been appointed Superintendent, and Edward Mahler Purchasing Agent.

## Employment.

Advertisements will be inserted under this heading for one dollar for each insertion.

**WANTED.**—A position as Master Mechanic or Foreman in a Machine Shop. Have had seven years' experience on new work and nine years on repairing. Can give good references. Address "D. S.," office of NATIONAL CAR-BUILDER.

**WANTED.**—A strictly reliable and competent man to design and superintend the production and manufacture of articles combined of wood and iron, in which a practical knowledge of the working of both is required, and also competent to estimate costs and manage men. Give age, former business and references. Address H. N. KNEELAND, care Azo Golf, 150 Nassau street, New York.

## FITCHBURG RAILROAD.

FOR SALE.

SIX SECOND-HAND PASSENGER CARS.

For Particulars Apply to

JOHN ADAMS, Gen'l. Supt. Fitchburg R.R.

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**SELECT  
FURNITURE  
Antique Pedigree  
SPANISH AND  
VENETIAN LEATHERS.**  
*Charles R. Vandell & Co.*  
INTERIOR DECORATIONS,  
Ohio Chippendale Materials,  
No. 6 East 14th Street,  
NEW YORK.

**JOEL H. MILLENER,  
RAILROAD CROSS TIES,  
AND  
TIMBER.**

Ties, spring delivery, Lake Erie and Ontario  
Ports

**220 Main Street, Buffalo, N. Y.  
HOWARD IRON WORKS  
BUFFALO, N. Y.,**

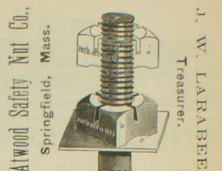
MANUFACTURERS OF  
Schlenker's Automatic Revolving Die Bolt  
Cutter and Nut Tapping Machine  
ADAPTED SPECIALLY FOR RAILROAD USE

**A. DEMAREST, JR.  
ENGRAVER OF WOOD  
179 BROADWAY  
(BET. CORTLAND & DEY STS.)  
NEW YORK.**

**ST. CHARLES CAR CO.,  
ST. CHARLES, MO.**

Freight Cars of every Description.

Capacity, 15 Cars per day.



a. Atwood Nut on bolt without bearing on base  
slots open.  
b. Atwood Nut turned to bearing c. partially closing  
the slots and grasping the bolt.

# JOHN W. MASURY & SON, Railway Varnishes, AND MANUFACTURERS OF CAR BODY COLORS.

By permission, we refer to the following Companies, for whom we have made Special Colors:

PENNSYLVANIA RAILROAD CO., Elmer Lewis, Purchasing Agent, Philadelphia, Pa.  
PENNSYLVANIA CO., Wm. Mullins, General Purchasing Agent, Pittsburgh, Pa.  
BALTIMORE & OHIO RAILROAD CO., S. H. Hill, Purchasing Agent, Baltimore, Md.  
CHICAGO & ALTON RAILROAD CO., A. V. Hartwell, Purchasing Agent, Chicago, Ill.  
CHICAGO & NORTHWESTERN RAILROAD CO., R. W. Hauser, Purchasing Agent, Chicago, Ill.  
LEHIGH VALLEY RAILROAD CO., L. Chamberlin, Purchasing Agent, Philadelphia, Pa.  
NORTHERN RAILROAD OF CANADA, F. W. Cumberland, Superintendent, Toronto, Ont.  
NADARUTUCK RAILROAD CO., O. W. Beach, Superintendent, Watertown, Conn.  
PHILADELPHIA, WILMINGTON & BALTIMORE RAILROAD CO., S. A. Hodgman, Superintendent of Motive Power, Wilmington, Del.  
NEW YORK, NEW HAVEN & HARTFORD RAILROAD CO., E. S. Dowd, Commissary, New Haven, Conn.

The advantages derived from the use of such Special Colors are many, a few of which are found below:

**ABSOLUTE UNIFORMITY OF SHADE, DURABILITY,** as we use perfectly pure materials, no extra amount of Varnish will be required to give a colored surface. **SAVING OF MONEY,** because of small quantity required. **SAVING OF TIME,** in the putting on of the same. **SAVING OF LABOR AND MATERIAL,** no extra amount of Varnish will be required to give a colored surface. **LARGER DEGREE OF CERTAINTY** that there will be an absence of cracked work, as our mixtures are all uniform, being done by weight only. We make any desired shade, if only being necessary that purchasers furnish us with sample of color desired, stating the time they would like to have the paint dry in.

We shall be glad to furnish samples and give prices to any who may wish to avail themselves of the above advantages.

Very respectfully

JOHN W. MASURY & SON, New York and Chicago.

Established 1826.

**Shipman & Bolen, Manufacturers of fine  
Railway Varnishes,  
No. 352 Mulberry St., Newark, New Jersey.  
BILLINCS, TAYLOR & CO.,  
(INCORPORATED.)  
AND MANUFACTURERS OF  
COACH AND CAR COLORS AND FINE VARNISHES.  
N. Y. Office, 105 John Street.  
CLEVELAND, OHIO.**

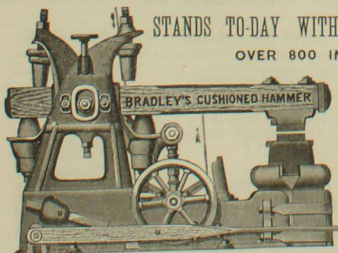
**JAMES T. PATTEN,  
RAILWAY EQUIPMENT.**

Wason Mfg. Co., of Springfield, Mass. Portland Company, of Portland, Me.  
RAILWAY CARS, ETC. LOCOMOTIVES.

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**BRADLEY'S CUSHIONED HAMMER**

STANDS TO-DAY WITHOUT AN EQUAL.  
OVER 800 IN USE.



It approaches nearer  
the action of the Smith's  
arm than any hammer in  
the world.

**BRADLEY & CO.,**

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(Established 1832.)

**CLEVELAND, COLUMBUS, CINCINNATI & INDIANAPOLIS RAILWAY.**

Evening trains leave CLEVELAND daily with Rotunda sleeping cars for COLUMBUS, CINCINNATI, INDIANAPOLIS, LOUISVILLE, TERRE HAUTE, EVANSVILLE, ST. LOUIS and all points West and South. Morning trains leave Daily, except Sunday, with Through Palace Coaches, for COLUMBUS, CINCINNATI, INDIANAPOLIS, LOUISVILLE, and ST. LOUIS without change. This is the only line making direct communication with all the Principal Trunk Lines of the East for NASHVILLE, MEMPHIS, NEW ORLEANS and all points in the West by way of LOUISVILLE or ST. LOUIS. Direct connection at ST. LOUIS for all Railway Towns in Kansas, Nebraska and Colorado.

**Equipment Complies all Valuable Improvements.**  
E. B. THOMAS, General Manager. A. J. SMITH, General Ticket Agent.

**MALLEABLE  
RAILWAY AND CAR-BUILDERS  
CASTINGS FOR  
IRON  
SPECIALTY.  
ORDERS AND CORRESPONDENCE  
DAYTON MALLEABLE  
IRON CO., DAYTON, O.  
AIR FURNACE IRON.**

**THE AJAX METAL COMPANY.**

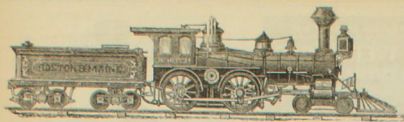


Having largely increased the capacity of our Foundry or Casting Department, and introduced all the new improvements in order to facilitate business, we are now prepared to fill orders for castings of every description with promptness and dispatch, made either of our "Ajax Metals" or of any alloy our patrons desire, at the lowest rates a new first-class competition can be made. Our specialty is car-brasses or Bearings bored to size, and coated with our Patent Adhesive Metal. To this Adhesive coating we invite special attention, as it proves to be what is desired for a solid brass bearing. We shall be pleased to submit sample brasses coated with this Metal to any Master Car-Builder or Master Mechanic that desires same.

We will make special prices in large lots to Locomotive and Car Builders. Correspondence solicited.

**THE AJAX METAL COMPANY,**  
14 North Fifth Street, Philadelphia, Pa.

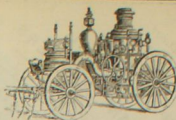




## MANCHESTER LOCOMOTIVE WORKS, LOCOMOTIVES,

AND THE  
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## HINKLEY LOCOMOTIVE COMPANY,

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## LOCOMOTIVE ENGINES

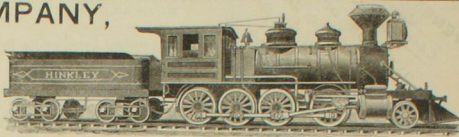
FOR ALL GAUGES.

Best workmanship and interchangeability of parts guaranteed.

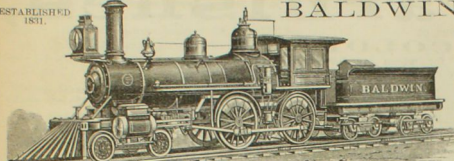
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adapted to every variety of service, and built accurately to standard gauges and templates. Like parts of different engines of same class perfectly interchangeable.

Passenger and Freight Locomotives, Mine Locomotives, Narrow Gauge Locomotives, Steam Street Cars, etc. Illustrated Catalogues furnished on application of customers. All work thoroughly guaranteed.

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## BROOKS LOCOMOTIVE WORKS,

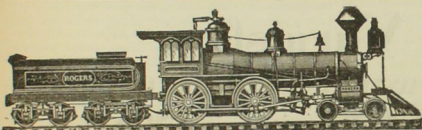
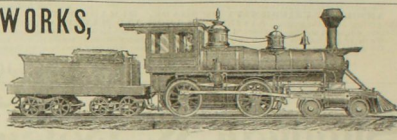
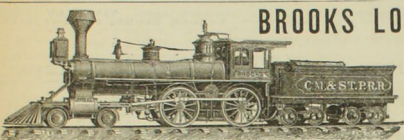
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Orders Solicited for Locomotives Adapted for Every Class of Railway Service.

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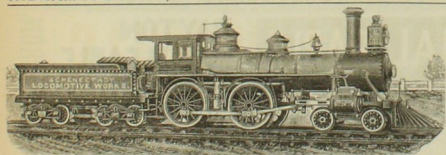
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Seranton and Wilkes-Barre, Pa.,

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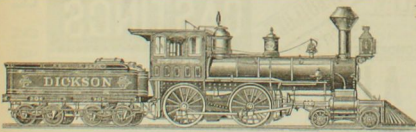
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The different classes constructed according to standard gauges and templates, so that like parts are interchangeable and may be ordered by number.

MINING, HOISTING and PUMPING MACHINERY a specialty. Car Wheels, Forgings, and Machinery of all kinds. Specifications and plans furnished on application. General Office, Seranton, Pa.

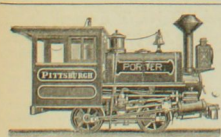
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Builders of All Kinds of

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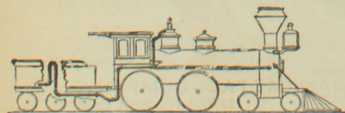


SHIPPING LOCOMOTIVE

## THE ASHTON VALVE COMPANY,

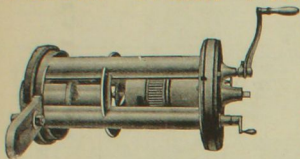
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The Ashton Blow-back Safety-valve is constructed so as to conduct the escape steam which is blown off back of the tender, or to the smoke box and up the chimney. By this arrangement the heat of the escape steam, instead of being wasted as it is when an ordinary safety-valve blows off, is communicated to the cold water in the tender. This not only results in an important economy, but it renders the escaping steam noiseless, and the increase of temperature of the water has a tendency to deposit some of its impurities before it is pumped into the boiler. It thus stops the noise, saves fuel, and at the same time works better and faster, and does more effective work with these valves than with those in ordinary use.





## Patent Crank Pin Machine.



For Turning of CRANK PINS in Position, and while WHEELS are UNDER Engine.

L. B. FLANDERS Machine Works,

PEDRICK & AYER, PROPRIETORS,  
1,025 Hamilton Street,  
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New Descriptive Catalogue on application



TRADE

MARKS:

"Phosphor-Bronze."

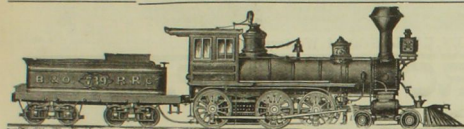
## PHOSPHOR-BRONZE,

For Bearings of Locomotives, Cars and Machinery, SLIDE VALVES, CYLINDER RINGS AND STEAM CONNECTIONS. SAVES OIL AND REPAIRS, PREVENTS DELAY TO TRAINS, AND NEVER CUTS THE JOURNALS.

Pamphlets and particulars on application

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Locomotive Engines for Broad or Narrow Gauge Roads,  
From standard designs, or according to special orders, to suit purchasers.

Tanks, Locomotive or Stationary Boilers Furnished at Short Notice  
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## DAMASCUS BRONZE,

Formerly Manufactured by the WESTINGHOUSE MACHINE CO., now made exclusively by the Damascus Bronze Company for BEARINGS for Locomotives, Cars and Machinery. We would call the attention of Master Mechanics and Master Car-Builders to our

### PEERLESS BEARING METAL,

Claiming it to have more Anti-Friction qualities and to be more durable than any Bronze or Brass on the Market.

The Metal is for Sale Either in Ingot or Castings.

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Steel Rails and Fastenings, General Line Equipments.

Iron Ship and Bridge Building Materials.

Steel Roller, Bridge and Ship Plates, Angles and Beams.

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SHEETS, BOLTS, RODS,  
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REFINED INGOT COPPER  
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Factories at Ansonia Conn.

Boiler,  
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STEELS.

Quality Unsurpassed. Plates up to 100 inches in width.

**FIRE  
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Purity and  
Ductility and  
Softness.

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HOPKINS' LEAD AND BEARINGS

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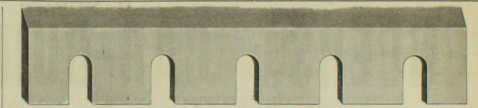
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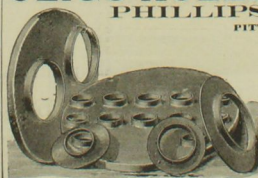
MACHINE KNIVES, PLANING, TENONING, Etc.  
All Kinds Machine Cutters to Pattern.

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"Sligo" Boiler Plate and Fire Box Iron.  
"Sligo" Bar, Band, Sheet and Angle Iron.

"Sligo" Stay Bolt Iron.  
Used by the Principal Railroads in the United States, and Warranted Unexcelled.

"TYRONE" BRAND BAR SHEET. TANK PLATE and ANGLE IRON.

Quality our Specialty. SEND FOR PRICE-LIST.

W. D. WOOD & CO'S  
Limited.



PATENT PLANISHED SHEET IRON.  
Patented March 14, 1865; April 8, 1873; Sept. 9, 1873; Oct. 6, 1874; Jan. 11, 1876.

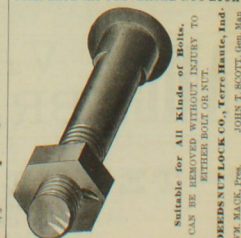
Guaranteed fully equal, in all respects, to the IMPORTED RUSSIA IRON.  
And at a much less price.

LOCOMOTIVE JACKET IRON  
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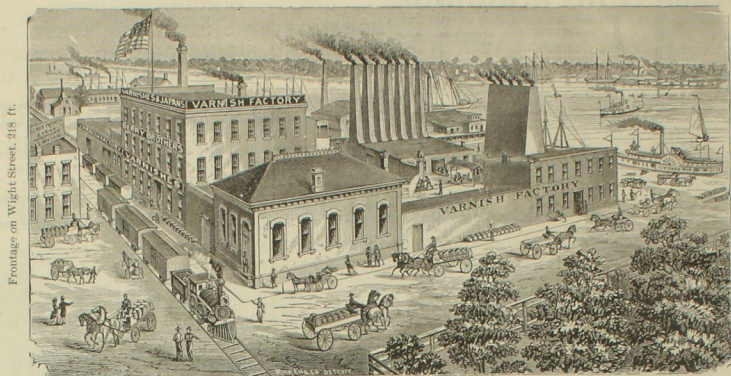


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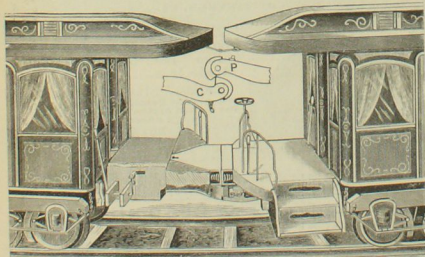
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(1)	H. C. Ballie, <i>Supt. Car Dept.</i> .....	Milwaukee, Wis
(2)	J. C. Atkins, <i>Asst. Gen. Supt.</i> .....	Milwaukee, Wis
(3)	Chl. Div. Insp. M. W. Kellie, <i>Supt.</i> .....	do
(4)	Ill. La Crosse Div. W. G. Collins, <i>Supt.</i> .....	Milwaukee, Wis
(5)	C. Bluffs Div. A. J. Earling, <i>Supt.</i> .....	Marion, Ia
(6)	R. B. Campbell, <i>Supt.</i> .....	Milwaukee, Wis
(7)	H. C. Prior, <i>Asst. Gen. Supt.</i> .....	Minneapolis, Minn.
(8)	M. J. O'Pattie, <i>M. M.</i> .....	do
(9)	Ia Minn. Div. H. B. Williams, <i>Supt.</i> .....	do
(10)	La. Div. F. J. Greenwood, <i>Supt.</i> .....	Lacrosse, Wis
(11)	Riv. & Dub. Divs. C. M. ...	do
(12)	N. S. Charley, <i>M. M.</i> .....	Dubuque, Ia
(13)	Ia & S. Div. J. C. Barnhorn, <i>Supt.</i> .....	Mason City, Ia
(14)	S. C. & Dub. Div. N. J. ...	do
(15)	D. H. Moulton, <i>M. M.</i> .....	Yankton, Dak
(16)	D. H. ...	do
(17)	So. Wn. Div. ...	Racine, Wis
(18)	W. ...	Racine, Wis
(19)	North Taylor, <i>M. M.</i> .....	Racine, Wis
(20)	E. Eddy, <i>M. C. B.</i> .....	Racine, Wis
(21)	North ...	do

Wm. Kittredge, *M. C. B.*, Milwaukee, Wis.  
Chicago, Pekin & So. Wn. R. R. 474, 88 m. 11 to 474.  
Chicago, 1881, 1882, 1883, 1884, 1885, 1886, 1887, 1888, 1889, 1890, 1891, 1892, 1893, 1894, 1895, 1896, 1897, 1898, 1899, 1900, 1901, 1902, 1903, 1904, 1905, 1906, 1907, 1908, 1909, 1910, 1911, 1912, 1913, 1914, 1915, 1916, 1917, 1918, 1919, 1920, 1921, 1922, 1923, 1924, 1925, 1926, 1927, 1928, 1929, 1930, 1931, 1932, 1933, 1934, 1935, 1936, 1937, 1938, 1939, 1940, 1941, 1942, 1943, 1944, 1945, 1946, 1947, 1948, 1949, 1950, 1951, 1952, 1953, 1954, 1955, 1956, 1957, 1958, 1959, 1960, 1961, 1962, 1963, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552,

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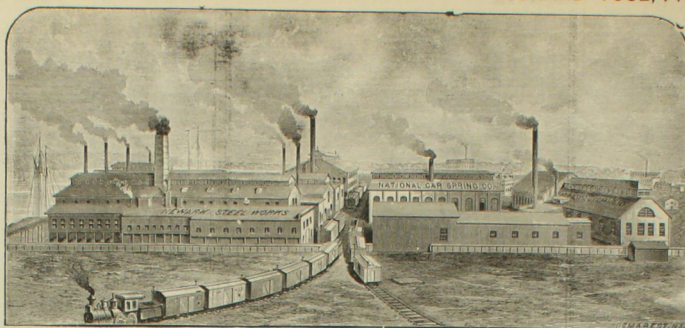
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# HOPKINS VERSUS LE ROY!

### THE QUESTION.

Does the Le Roy Journal Bearing Company "stand ready" to make what are commonly known as Hopkins Journal Bearings, because of numerous disputes, failures, resulting from the use of the weak, gridiron arrangement known as the Le Roy Bearing heretofore made and sold to them, and the consequent necessity of going out of business or giving their customers a really good bearing even if they have to "pirate" the invention for which a patent was granted to Hopkins that has been declared valid by both the Eastern and Western Railroad Association?

Does the Le Roy Company expect to build up a business by infringing Hopkins' Patent, and selling bearings, and a lawsuit with them?

In the recent interference patent fight between Hopkins and Le Roy, the Commissioner of Patents, in his final decision, which was rendered August 31, 1883, says:

"On the broad claim, as well as the specific claim covering the device embodying not only the broad but the specific invention of a journal bearing with a soft metal lining, with ridges or projections so arranged that, upon being brought in contact with the axle, the ridges or projections will yield and spread out so as to make a perfectly-fitting box, priority of invention must be awarded to Hopkins."

As to the specific arrangement for which priority of invention was awarded to Le Roy, all will perceive that the broad claim for which priority of invention is awarded to Hopkins, and the very broad claim embodied in the patent granted him Oct. 16, 1883, in the following words: "A Journal Bearing made of two different metals, one of soft or yielding nature, and the other of a hard or unyielding nature, the soft or yielding carrying ridges or spurs which receive the initial pressure of the journal, and by the rolling action of the same and the load pressure upon the bearing become crushed down and spread in conformity with the contour thereof, as described, whereby the surfaces in wearing contact are adjusted to each other, substantially as specified."

### COVERS THE WHOLE CASE

As to his being the prior inventor of Bearings with soft metal ridges for receiving the Initial pressure of the Journal, and leaves him absolute master of the situation.

All parties are hereby warned that my rights under said Letters Patent will be enforced.

**D. A. HOPKINS, Patentee and Manufacturer,**

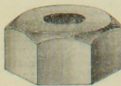
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New York.

**Rhode Island Tool Company,**

MANUFACTURERS OF

COLD PUNCHED, SQUARE AND HEXAGON



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All Linseed Oil bearing the above brand delivered by us is of OUR OWN MANUFACTURE, and guaranteed absolutely pure.

Our BOILED OIL will be POSITIVELY BOILED

J. A. DEAN & CO.,

181 FRONT STREET, NEW YORK.







# LE ROY VICTORIOUS.

The following is the FINAL decision of the Patent Office in the matter of the Interference of HOPKINS vs. rennered August 31, 1883

"COPY."

Department of the Interior, United States Patent Office

Washington, D. C., Sept. 1, 1883.

"In the matter of the interference of)  
HOPKINS vs. LE ROY. On Appeal to the Commissioner.

"For a Journal Box composed of Hard and Soft Metal, the SOFT METAL BANDS PROJECTING ON THE JOURNAL BEARING SIDE BEYOND THE SURFACE OF THE HARD METAL, Priority of Invention Must be Awarded to LE ROY."

By direction of the Commissioner.

Very respectfully, (Signed)

SCHUYLER DINGEE, Chief Clerk.

To T. V. LE ROY, Care John R. Bennett, No. 237 Broadway.  
George Harding, Counsel.

Thus reversing all former decisions made in favor of HOPKINS, dissolving the interference heretofore declared in his favor, and sustaining the validity of the LE ROY Patent and every claim made by LE ROY for his Invention.

## LE ROY JOURNAL BEARING CO.,

145 Broadway, New York City.

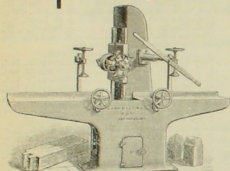
GEORGE W. McLEAN, President.

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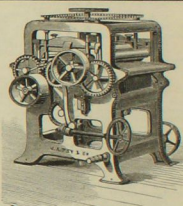


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SILL AND TIMBER DRESSING,  
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The attention of railroad men is invited to the Detroit Lubricator Co.'s Patent Sight Feed Lubricators, for oiling locomotive valves and cylinders, and the Westinghouse Air Pump. Both cups are placed within the cab. The valve cup has a double sight feed, each of which is connected to the right and left hand steam chests, by means of the so-called "tallow pipes," running beneath the jacket, thus securing independent lubrication to each steam chest and cylinder from the one cup. The oil is shown passing in drops through each sight feed glass to the parts to be lubricated, and can be regulated to feed fast or slow. The feed is regular and continuous, going up or down grade, whether pressure is on or off, thus securing perfect lubrication at all times. What is said in reference to the valve cup, is equally true in regard to our lubricator for the Westinghouse Pump. By the use of these cups, the saving in wear and tear of machinery and the additional power gained is simply wonderful, as is proved by actual results.

We solicit a practical test, and will send one or more valve and air-brake cups to responsible parties on 30 days' trial. Details and drawings showing manner of attachment and prices furnished on application.

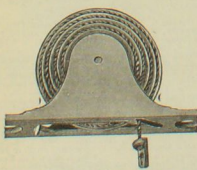
DETROIT LUBRICATOR CO.

Office: 129 CRISWOLD ST.,

DETROIT, MICH.

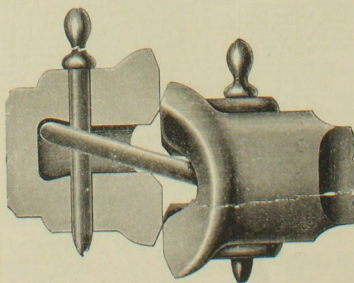
\* Numerous examples can be furnished where engines have run two years and over, without having had their valves freed. The average mileage for the air-brake lubricator is 500 to 1,000 miles to the 1/4 pint, and example can be given where this mileage has been greatly exceeded, among which is one of 1,612 miles with a 1/4 pint of oil on a daily run of 208 miles with 64 stops. This pump has run nine months without having had 25 cents expended on it for repairs.

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Victory over more than 30 Self-Couplers in the Master Car-Builders' Convention of June, 1876. Also improvement for safety in coupling by the Yard Masters, in their Convention, June, 1877, and by 300 others who were unable to attend the Convention, and 300 railroad officials who are resident in 35 States, and who admitted superiority over any other yet produced. Try 30 free of royalty, and see for yourself! Patent free, and no change in timbers or connections. Those made by Wilson, Walker & Co., Pittsburgh, Pa., will save 100 per cent. in repairs, and give double life service over old styles of wrought iron. About 40,000 in use by 140 railroads. The saving in repairs by using my invention is from 20 per cent. to 80 per cent. as per report of many officers.

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EAGLE IRON WORKS  
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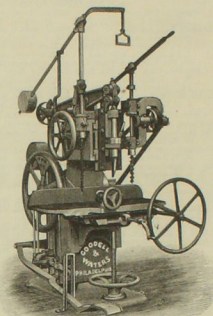




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HEAVY CAR MORTISER.

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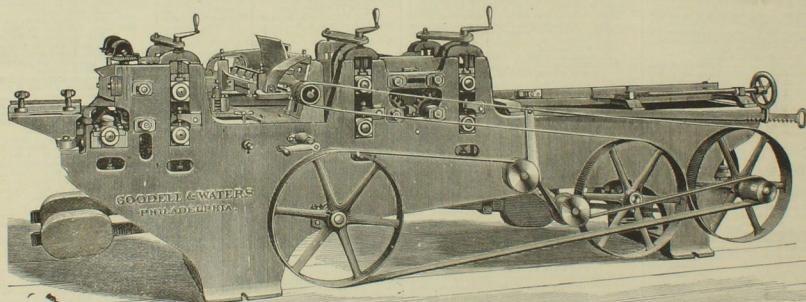
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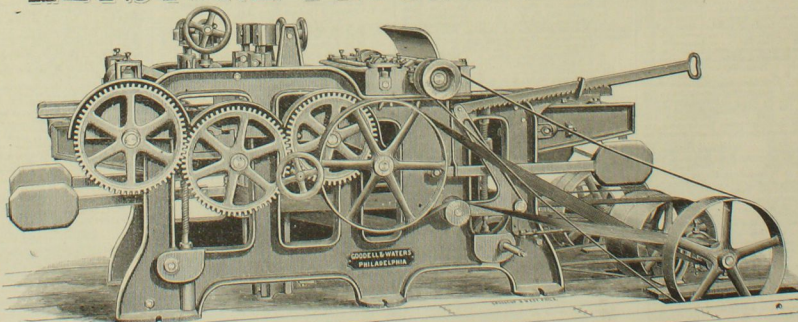
has now an established reputation as a special machine for rapid and good work.

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In this machine we have retained the most desirable adjustments of the Woodworth Machine, and especially of the Woodbury Pressure Bar; we apply these bars and adjustments to both bottom and topheads and they will be found to be new in design, SELF ACTING AND RELIABLE.



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is larger than ever and continually increasing in variety. It now embraces first-class machines for bandsawing, slitting and cut-off sawing, resawing and scroll sawing, jointing, grooving, molding, ironing, turning, mortising, shaping, etc. with requisite shafting, pulleys, hangers, arbors, knives, cutters, chisels, and fixtures for railway and street car builders, ship joiners, makers of heavy and light agricultural implements, pianos, organs, clock cases, furniture, boxes, toys, models and in fact all wood work.

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5 g. 12 m. 3 ft. 12 cars.  
Edward J. Thomas, *Supt.* Savannah, Ga.  
R. F. Brown, *M. M.* Savannah, Ga.  
G. W. Mattan, *M. C. B.* Savannah, Ga.  
Lykhill & Lehigh R. R. (*See Phil & Read.*)  
arie Valley R. R. (*See Middleburg & Sch.*)  
o Valley R. R. 4-8 1/2 g. 132 m. 17 ft. 564 cars.  
Geo. Blenner, *Supt.* Columbus, O.  
R. Bromley, *M. M.* & P. A. Portsmouth, O.

E. G. Ohio, *Maat*, *Trans.* 1801, p. 21. 384 c.  
J. A. Walton, *Pur. Apt.* . . . Portsmouth, Va.  
M. Pendleton, S. M. P. & M. Portsmouth, Va.  
I. A. Ward & Southern Ry. . . .  
paville R. R. . . . 4-8 1/2 c. 23 m. 3 lo. 13 cars  
Walter Pierce, *Gen. Man.* . . . Sharpville, Pa.  
andosh Valley R. R. . . . 4-0 g. 240 m. 32 lo. 849 c.  
Korfolk & Western R. Co. g. 486 m. 82 lo. 1,770 c.  
H. H. . . . Roanoke, Va.  
W. C. De Armond, *Pur.* . . . Philadelphia, Pa.  
Chas. Blackwell, *Supt.* of M. P. R. Roanoke, Va.  
Val. Rd. : D. W. Flickwir, *Supt.* Roanoke, Va.  
W. Welch, M. M. . . . Roanoke, Va.  
S. & N. W. R. R. Frank Huger, *Supt.* and  
F. Stern, M. M. . . . Lynchburg, Va.  
S. & W. E. D. J. N. M. Osborne, *Supt.* and

J. T. Robinson, *M. M. & C. B.*, Petersburg, Va.  
 rango & Alibeth R.R. 4-9½ g. 57 m. 8 lo. 248 c.  
 J. T. Blair, *G. Man. & Par. Agt.* Greenville, Pa.  
 dward Richardson, *M. M. & C. B.* Greenville, Pa.  
 aug R. R. 4-8½ g. 38 m. 3 lo. 28 cars  
 Edwin McNeill, *Supt.*..... Litchfield, Ct.  
 M. Allen, *M. M. & C. B.*..... Litchfield, Ct.  
 la, Ripley & Ky. R. R. 3 g. 25 m. 2 lo. 23 cars  
 C. L. Harris, *Supt. & Par. Agt.*..... Ripley, Miss.  
 W. H. Phelps, *M. M.*..... Ripley, Miss.  
 City, Deming & Pacific R.R. 3 g. 47 m. 31. 141 c.  
 John W. Smith, *Gen. Supt.*..... Litchfield, Ct.  
 Lake Ry. 4-8½ g. 6 m. 1 lo. 4 cars  
 E. G. Matthews, *Supt.*..... Perry, N. Y.  
 ion & Durango R.R. 4-8½ g. 38 m. 2 lo. 40 cars  
 H. M. Fickinger, *Supt.*..... Altamira, Sinaloa, Mex.

John E. Bell, M. C. B. .... Culiacan, Mex.  
 4-8 1/2 g. 5 m. 31.0 5 cars.  
 J. McQuay, *Supt.* .... Skaneateles, N. Y.  
 City & Pacific R.R. 4-8 1/2 g. 5 m. 28 1/2 cars.  
 E. Hall, *Gen. Man.* & P. A. Cedar Rapids, Ia.  
 C. M. Lawler, *Gen. Supt.* .... Missouri Valley, Ia.  
 J. S. Wattles, *Supt.* .... Missouri Valley, Ia.  
 E. F. May, *Asst. Supt.* .... Bluff, Neb.  
 S. A. Teal, .... Missouri Valley, Ia.  
 W. H. Ramseyer, M. C. R. .... Missouri Valley, Ia.  
 Iowa & Delaware Bay R. R. (See Kent County).  
 Bay & Southern Ry. 4-8 1/2 g. 34 m. 4 lo. 40 c.  
 A. S. Starnes, *Gen. Man.* .... Sodus Point, N. Y.  
 S. B. Stuart, *Supt. & Sec.* .... Sodus Point, N. Y.  
 J. C. Thomas, M. C. B. .... Sodus Point, N. Y.  
 C. H. Hill, M. C. B. .... Sodus Point, N. Y.  
 4-8 1/2 g. 25 m. 31.0 24 cars.  
 Ernest R. R.

W. M. Ayer, *Supr. & Pur. Agt.* W. Waterville, Me.  
C. Crowell, M. C. B. .... No. Anson, Me.  
W. Smet & Cambria R. Ry. .... (See B. & O.)  
C. Ry. .... (See A. T. & O.)  
B. & North Alabama R. Ry. (See Louis. & Nash.)  
h Carolina Ry. 5 g. 246 m. 42 l. 742 cars.  
John B. Peck, *Gen. Man.* ..... Charleston, S. C.  
S. B. Pickens, *Pur. Agt.* ..... Charleston, S. C.  
J. C. Jones, *Supr. & Pur. Agt.* ..... Charleston, S. C.  
Geo. H. Gramling, M. C. B. .... Charleston, S. C.  
h Eastern Ry. 4-54 g. 200 m. 20 l. 826 cars.  
T. A. McKinnon, *Gen. Man.* ..... Montreal, Can.  
A. G. Eastman, M. M. .... W. Farnham, P. Q.  
h Florida R. Ry. 3 gauge 40 m. 5 l. 53 cars.  
R. R. Smet, *Supr. & Pur. Agt.* ..... Sanford, Fla.  
C. C. Haskell, *Pur. Agt.* ..... Sanford, Fla.  
J. A. Campbell, M. M. .... Sanford, Fla.

A. D. Stentford, *M. C. B.* . . . . . Sanford, Fla.  
Mountain R. R. . . . . 4-8½ g. 18 m. 4 lo. 22 c.  
W. H. Woodward, *Supt. Pine Grove Furnace*, Pa.  
Pacific Coast R. R. . . . . 3 g. 31 ml. 14 lo. 500 cars  
Pacific Coast R. R. . . . . 3 g. 31 ml. 14 lo. 500 cars  
G. H. Waggoner, *Par. Agt.*, San Francisco, Cal.  
E. L. Reese, *M. M. & C. B.* . . . . Newark, Cal.  
Western R. R. (Ky.) . . . . . (See Central of Va.)  
Western Ry. (Ga.) . . . . . 4½ g. 4 m. 1 lo. 38 cars  
M. Wilson, *Asst. Supt.* . . . . . 21 b. 100 b. 100 b.  
J. Tomlinson, *Par. Agt.*, Harrodsburg, Ky.  
Northern Central R. R. . . . . 4-8½ g. 156 m. 12 lo. 467 c.  
James G. Knapp, *Supt. Par. Agt.*, Auburn, N. Y.  
Chas. G. Brown, *M. M.* . . . . . Auburn, N. Y.  
J. Mooney, *E. C. B.* . . . . . Auburn, N. Y.  
Horn Kays, *R. R.* (800 ft.) . . . . . 30 m. 100 b.  
Northern Maryland R. R. . . . . 4-8½ g. 70 m. 1 lo. 26 c.

Robert Knight, *Supt.* ..... Brandywine, Md.  
C. R. Joyce, *M. M.* ..... Brandywine, Md.  
Norman Pacific R. R. - 4-84 1/2. 198 m. 30. lo. 728 c.  
northern Div. (*For other Divs. see Cen. Pac.*)  
A. C. Bassett, *Supt.* ..... San Francisco, Cal.  
J. W. R. Wilson, *Pres. Agt.* ..... San Francisco, Cal.  
J. T. Wilson, *M. M.* ..... San Francisco, Cal.  
F. N. Bellisle, *M. C. B.* ..... San Francisco, Cal.  
Norman Pacific R. R. of Arizona. (*See Cen. Pac.*)  
Norman Pacific R. R. of New Mexico. (*See Cen. Pac.*)  
Tomburg, Union & Columbia R. R.  
..... (*See Rich. & Dm.*) (*3 Div.*)  
Charles Brook R. R. ..... 4-3 g. 8 m. 1 lo. 18 cars  
Charles Pugh, *Pres.* ..... Pittsburg, Pa.  
Hugh Hill & Parrsboro Ry. (*See Cumberland.*)  
Wrightfield, Effingham & So-E'n Ry. (*See Ind. & JIL*)

Village & Sardinia Ry. 4-8½ g. 12 m. 1 lo. 8 c.  
Bertrand Chaffee, Pres., Springfield, N. Y.  
Rox & Lambscot R. R. 4-8½ g. 22 m. 4 lo. 16 c.  
W. H. Wainwright, Sec'y, Saratoga Springs, N. Y.  
H. G. Corson, M. C. 8-9 g. 11 m. 1 lo. 10 c.  
M. G. Tinker, M. C. B. 8-9 g. 11 m. 1 lo. 10 c.  
John & Maine Ry. (See New Brunswick.)  
John's Ry. 4-8½ g. 14½ m. 2 lo. 24 c.  
R. McLaughlin, P. O. Supr., Jacksonville, Fla.  
Go. Ferro, M. C. 4-8 g. 11 m. 1 lo. 10 c.  
Fla. John's Lake Eustis Ry. 3 g. 26 m.  
W. J. Jarvis, Supr., Ft. Mason, Fla.  
Hubert & Lake Champ 4-8½ g. 120 m. 10 lo. 37 c.  
R. Jewell, Sec'y, P. A. St., Johnsonville, Vt.  
Geo. E. Howland, M. C. 4-8 g. 11 m. 1 lo. 10 c.  
Joseph Valley R. R. 3 g. 15 m. 11 lo. 11 c.  
J. H. Matthews, Gen. Supr., Berrien Springs, Mich.

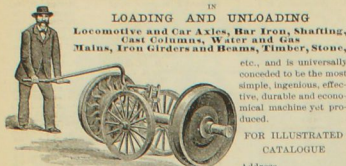
T. T. Onderdonk, *Supt.*..... 3c 13 m. 3 lo. 64 cars.  
 Joseph & Western R. R. (See *Union Pac.*) (1 Div.)  
 Joseph & Des Moines R. R. (See *C. & St. J. & C. B.*)  
 Lawrence, *Gen. Mgr.*..... (See *Can. Pac.*)  
 Lyons, Alton & Trent Haute R. R. ....  
 Main Line. (See *C. & C. I. Ind.* and *St. L. Div.*)  
 Louisville & Cairo Div. : 4-8½g 137 m. 17 lo. 800 c.  
 J. W. Parker, *Gen. Man.*..... St. Louis, Mo.  
 J. L. Hinchey, *Supt.*..... Belleville, Ill.  
 A. M. De Cleru, *Gen. Mgr.*..... St. Louis, Mo.  
 Union Bridge Co. and Tunnel R. R. ....  
 : 4-8½g 31 m. 18 lo. 11 cars.  
 Wm. Tamsing, *Gen. Man.*..... St. Louis, Mo.  
 W. D. Dickinson, *Supt.*..... St. Louis, Mo.  
 E. Williams, *Gen. Mgr.*..... St. Louis, Mo.  
 H. M. Smith, *M. M.*..... St. Louis, Mo.

Jas. Coal Hk., *Gen. Supt.* ..... 4-8½ g. W. 10 lo. 25 c. Ill.  
 Jas. Prentice, *Supt.* ..... Carbonado, Ill.  
 Jas. C. Bryden, *Pur. Agt.* ..... St. Louis, Mo.  
 Des Moines & Northern Ry. 4-8½ g. 43 m.  
 C. F. Merk, *Supt.* ..... Des Moines, Ia.  
 Ft. Scott & M. R. Ry. 4-8½ g. 130 m. 50 c. Mo.  
 F. Tiernan, F. P. & Gen. Man., Fort Scott, Kan.  
 J. W. Miller, *Gen. Supt.* ..... Fort Scott, Kan.  
 A. Popkew, *Pur. Agt.* ..... Fort Scott, Kan.  
 Henry Berger, M. M. .... Ft. Scott, Kan.  
 A. A. Tipton, M. M. .... Ft. Scott, Kan.  
 Hannibal & Keokuk, 4-8½ g. 55 m. 50 c. Mo.  
 W. W. Walker, *Gen. Supt.* ..... Hannibal, Mo.  
 Geo. Douglass, *Pur. Agt.* ..... Hannibal, Mo.  
 Irons, Mt. & So'n Ry. (See Mo. Pac., 4) Dec.  
 Keokuk & N. W. Ry. (See C. & N. W. Q.)  
 Salem & Little River, 4-9 g. (See C. & N. W. Q.)

H. A. Crawford, <i>V. Pr. &amp; P. A.</i> .....	St. Louis, Mo.
E. B. Sankey, <i>Supt.</i> .....	Salem, Mo.
Thomas Everson, <i>M. M.</i> .....	Steelville, Mo.
J. W. Houston, <i>M. C. B.</i> .....	Steelville, Mo.
Van & T. Haute R. R. (See Penna. Co., (10) Div.)	
ails & Cairo R. R. 3 g. 153 m. 22 lo. 806 cars.	
Shas Hamilton, <i>Gen. Supt.</i> .....	St. Louis, Mo.
R. M. Pringle, <i>M. M.</i> .....	St. Louis, Mo.



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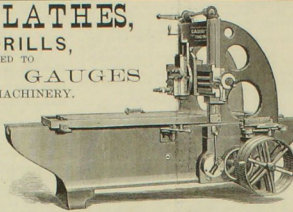
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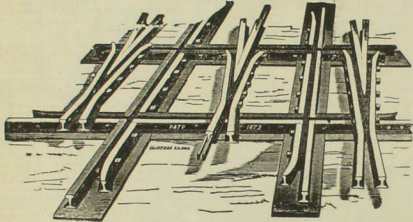
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Now in use on over 20  
Trunk Lines.

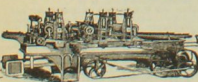
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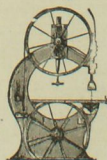
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ESPECIALLY ADAPTED FOR  
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MORE DURABLE, ECO-  
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LIABLE.

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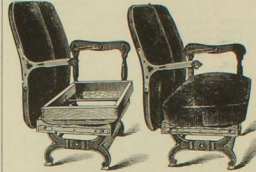
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Mason's Patent Improved Car Seat,  
THE PENNSYLVANIA.

NO BREAKING BY REVERSING RAPIDLY.  
HUNDREDS OF COACHES SEATED  
WITH THIS CAR SEAT.

It is the Penna. R. R. Standard Eastlake seat, and  
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As the back reverses, it raises the  
front of the seat so as to prevent  
the passenger from slipping out of  
the seat, and removes the ob-  
jection made to this kind of seat here-  
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Made with perforated Veneer,  
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changeable; one kind of seat can  
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other in the Winter.

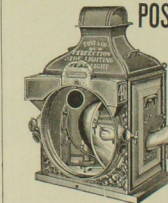
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Please send for Descriptive Circular giving  
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SIDE-LIGHTING  
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Largest and BEST MADE.

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thereby saving 75 cents of  
each week, and it over-  
comes the uncertainties  
of the flame, caused by  
splashing of the large  
quantity of oil in the reservoirs  
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View showing Manner of  
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View showing Side Signals,  
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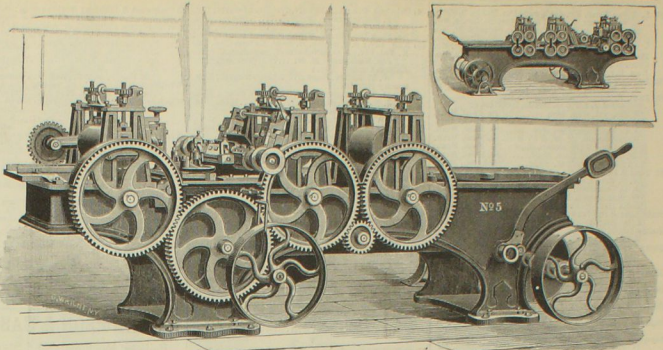
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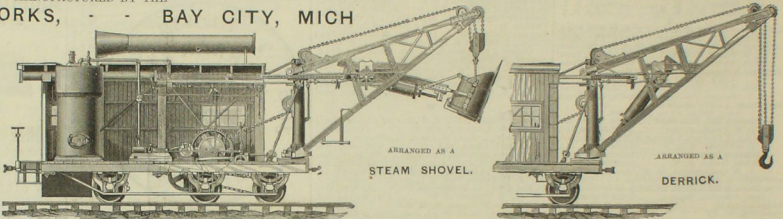
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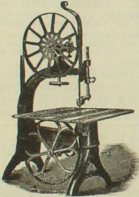
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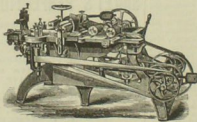
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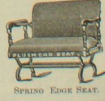
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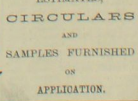
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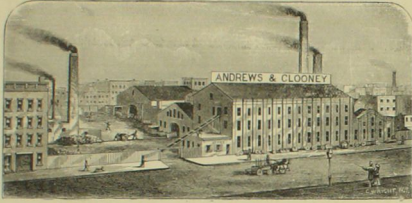
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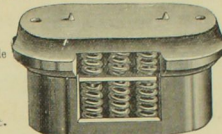
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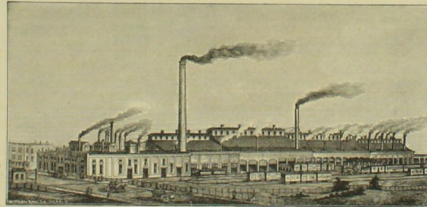
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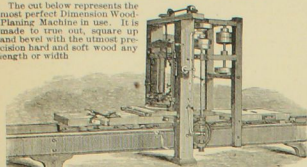
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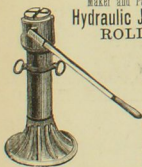
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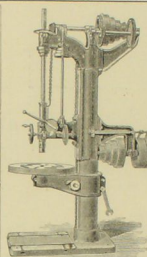
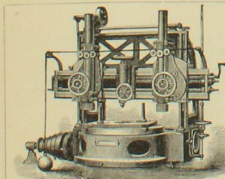
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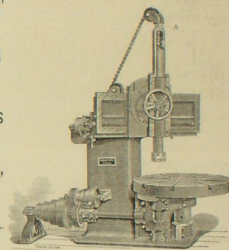
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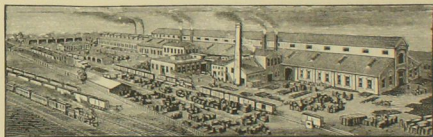
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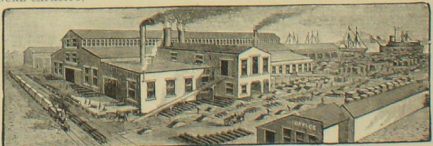
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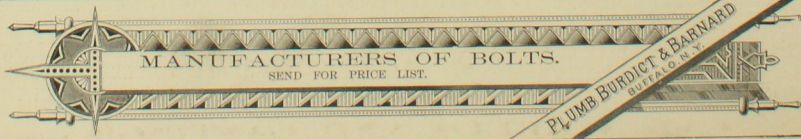
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